This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

WIDENER LIBRARY
HX HK1M 0

47.138

Sci 1635.12

SIGILL: COLL: HARVARD: CANTAB: NOV: ANGL: 1650.
CHRISTO ET ECCLESIAE

A Gift from
The Boston Daily
Advertiser Office,
9 Nov. 1867.

THIRD ANNUAL REPORT

OF THE

SECRETARY

OF THE

STATE BOARD OF AGRICULTURE

OF THE

STATE OF MICHIGAN,

FOR THE YEAR 1864.

E PLURIBUS UNUM
TUEBOR
SI QUAERIS PENINSULAM AMOENAM CIRCUMSPICE

BY AUTHORITY.

LANSING:
JOHN A. KERR & CO., PRINTERS TO THE STATE.
1864.

Sci 1635.12

1867. Nov. 9

From the Daily Advertiser Office

State Board of Agriculture.

His Excellency **AUSTIN BLAIR**, Ex-Officio,
PRESIDENT OF THE BOARD.

HEZEKIAH G. WELLS, of Kalamazoo, Kalamazoo County,
VICE PRESIDENT.

DAVID CARPENTER, of Blissfield, Lenawee County,

JUSTUS GAGE, of Dowagiac, Cass County,

ABRAHAM C. PRUTZMAN, of Three Rivers, St. Joseph Co.

CHARLES RICH, of Lapeer, Lapeer County,

A. S. WELCH, of Ypsilanti, Washtenaw County,

T. C. ABBOTT, A. M.,
PRESIDENT OF THE AGRICULTURAL COLLEGE, EX-OFFICIO.

SANFORD HOWARD, Secretary.

LANGFORD G. BERRY, of Detroit, Treasurer.

REPORT.

LANSING, December 15, 1864.

To the Legislature of Michigan:

In compliance with legal requisitions, the accompanying Report, (being for the year 1864,) with supplementary papers, is herewith submitted.

SANFORD HOWARD,
Secretary of the Michigan State Board of Agriculture.

REPORT OF THE SECRETARY OF THE BOARD OF AGRICULTURE.

The Secretary of the Michigan Board of Agriculture, on entering upon his duties, issued the following circular:

TO THE FARMERS OF MICHIGAN.

LANSING, June 1, 1864.

The Secretary of the Board of Agriculture desires to obtain correct information in regard to the Agricultural resources of the State, and with this view proposes the questions herewith annexed. Answers to them, or to any portion of them, or any information relating to rural affairs—whether specially called for by the questions or not—will be thankfully received. Replies should be forwarded as early as practicable, in order to render the matter they comprise available for the report of the present year. It is hoped that a ready response will be given to this call, and that materials will be thus gathered for the ground-work of a series of reports which shall advance the interests of the farmers of Michigan.

CULTIVATED CROPS.

1. How long has the soil of your section been cultivated, and what was its original character as to composition, wetness or dryness, &c.? State whether it was prairie, "opening," or wood-land, and if the latter, what were the prevailing species of trees.

2. What are the principal crops, and what has been their average yield per acre, from the first? If there has been an increase or a decrease, state how much, and from what causes, *particularly in reference to wheat.* State the comparative productiveness of different kinds of wheat—white and red.

3. What have been the ruling prices of different kinds of grain, hay, &c., since your section has been cultivated, what is the relative cost of the different crops, and which have been the most profitable? State what crops are sold, or what proportion of certain crops, and in general terms how the remainder is disposed of.

4. What kinds of fruits are cultivated in your section, what their relative profits, and also the profits of any kind, compared with other crops?

State what have been the prices of apples and other fruits, and for what markets they have been sold.

5. Are root crops cultivated in your section? If so, state what kinds are preferred, and the purposes to which they are devoted. State, also, any facts which are established, bearing on the question of the expediency of root-culture in Michigan.

LIVE STOCK.

6. Beyond the number of horses, cattle and swine, deemed essential to farm management, what description of live stock has been most profitable?

7. What have been the prices of beef, pork, mutton, butter and cheese, at your principal market stations or towns?

8. Which of the three kinds of meat mentioned in the foregoing question, can be produced at the least cost?

9. What is the average annual yield of butter per cow, and what of cheese?

10. What is the relative cost per pound, of butter and cheese? State if cheese is made on the so-called "factory system," in your neighborhood, and with what results.

11. What breed of cattle is most profitable in your vicinity, for beef, what for the dairy, and if oxen are used for labor, what for that purpose? State what have been the results of the introduction of any distinct breeds, and whence they were obtained.

12. What breed or *grade* of horses is best adapted to farm work, and what to traveling with light vehicles? State what height and weight of horses are preferred for farm work, and the same for those for traveling. State, also, what have been the results of the introduction of different kinds of horses into your section.

13. What breeds of sheep are kept in your section, what has been the average weight of their fleeces, washed or unwashed, and what prices have they brought per pound? State if sheep are fattened for market, either as lamb or mutton, and what breeds are most profitable for these purposes. State what have been the results of the introduction of any distinct breeds or families, and whence they were obtained.

14. What breed of swine is most profitable? State at what age swine are usually slaughtered, and what their average dressed weight.

IMPLEMENTS.

15. What labor-saving implements or machines have been introduced into your section, and to what extent has manual labor been thus dispensed with—in other words, with how much less manual labor can a given amount of products be obtained, than before such implements or machines were used?

16. What kind of reaping machines, and what kind of mowing machines

are used in your neighborhood? So far as preference is given to one kind over another, state why.

17. Are corn-planters, grain-drills, broadcast sowing machines (for grain, clover and grass seed, or fertilizers—as ashes, plaster, &c.,) used in your neighborhood, and with what results? State what kinds of these machines have been tried, and their relative merits, so far as ascertained.

18. What kinds of horse-rakes are used in your section, and what their respective advantages?

19. Are "horse-pitchforks" used in unloading hay, and if so, what is thought of them in reference to saving or lightening manual labor?

20. Are "hay-tedders" (machines to aid in drying hay) used in your neighborhood, and if so, what kinds, and with what results?

Describe any special improvement which has been made in ploughs, harrows, cultivators, *or any other implement*, and mention any new one that has been introduced.

MANURES.

21. To what extent are the solid and liquid excrements of domestic animals saved, and how saved, and applied to the land?

22. To what crops is stable or yard manure usually applied, and in what ratio does the application of a given quantity to the acre commonly increase the yield?

MISCELLANEOUS.

24. What has been the advance, if any, in the value of forest or woodland, within the last five years, and also the advance in the value of wood and lumber for the same period?

25. In clearing land, how are the different kinds of timber disposed of? State the prices received for the timber, or the articles into which it is immediately wrought.

26. What wages are paid to farm laborers by the day and month, at different seasons of the year? State at what rates wages have ranged in former years.

27. Have any experiments been made in under-draining in your neighborhood, either with tiles, stones, or other materials? If so, state on what kinds of soils, the manner in which the work was done, the cost per rod, and the general results.

28. What agricultural improvements are most needed in your section? Make suggestions as to what can be done to advance the agricultural interest.

In reply to these interrogatories, the following communications have been received:

FROM CALHOUN COUNTY.

BY JEREMIAH BROWN, OF BATTLE CREEK.

1. The soil of this section has been cultivated 28 years. Seven-eighths of it may be called dry, and one-eighth marsh, bottom and prairie. It is nearly all "oak openings."

2. The principal crops are wheat, corn and hay. Average—wheat 15 bush. per acre; corn 35; marsh hay 1½ tons; "tame hay," for the first ten years 1 ton; since then 1½. On good land, well cultivated, white wheat is the most productive, and on "fallow" ground the crop is one-third better than our first crops. This doubtless may be attributed to the use of clover.

3. The price of wheat ranged from 35 to 60 cts. per bush. for the first 15 years; since then from 60 cts. to $2. This fall $2.10 has been obtained. Corn has ranged from 25 cts. to $1; is now $1.70 per bushel. Marsh hay, from $2.50 to $10 per ton; tame hay, $5 to $12; it is now $16 to $20. Tame hay costs [per acre] one-third as much as wheat, and about half as much as corn. Of wheat, about seven-eighths is sold; the balance is consumed and used for seed. Of corn, about one-fourth is sold; one-half is turned into pork and beef, and one-quarter otherwise consumed. Of hay, one-fourth is sold, and the balance consumed.

4. The fruits cultivated are apples, pears, plums, cherries, peaches, quinces, currants, gooseberries, blackberries, raspberries, strawberries and grapes. Apples and peaches are the only large fruits raised in considerable quantity for market. Choice varieties of apples, average in price 40 cents per bushel; peaches 40 cents; strawberries about 10 cents per quart. Chicago is our principal market.

5. Root crops have been cultivated to a limited extent. The ruta baga, or Swedish turnip, constitutes seven-eighths of all root-crops grown here. The purple-top ruta baga is considered the best for stock, and the white French for the table. The ruta baga is usually fed to cattle, sheep and swine. It is very valuable for all these purposes, and it is much to be

regretted that it is so little grown. Swine will do well on the ruta baga alone. Six hundred bushels to the acre is a fair crop, but I have known 1,200 to be grown.

6. Beyond the different kinds of stock actually required in the management of a farm, sheep are the most profitable.

7. The price of beef during the last ten years, has averaged $3 per hundred, on foot; previous to that time all beef was consumed on the farm. Pork, previous to 1850, $2 per hundred; since then $3. Mutton, dressed, 4 cts. per lb. Butter 12½ cts. Cheese 9 cts., for the last 14 years.

8. Mutton can be produced at less cost than pork or beef.

9. I do not know the annual yield of butter and cheese, per cow.

10. No cheese is made on the "factory system."

11. Durham cattle are most profitable for beef. Devons and "Natives" for the dairy. The introduction of Durhams has been of great advantage to the farmer for the purposes of beef and oxen. They were introduced from the State of New York.

13. Merino sheep and their grades are most common. Average price of wool 42½ cts. per lb.; average weight of fleece 4¾ lbs. washed. Wethers only are fattened for the market. The introduction of the Merino has added 33⅓ per cent. to weight of the wool. They were introduced mainly from Vermont—some from New York. Some flocks average over 6 lbs. to the fleece. This weight may easily be obtained by skill in breeding, and care of the flock.

14. The Chester White Swine are preferred.

15. Our labor-saving implements are the reaper, mower, gang-plow, grain-drill, the Geddes harrow, iron-beam plow, corn-sheller, and the corn and field cultivator. The introduction of the above implements has saved fully a quarter of the labor formerly required to raise the same amount of grain.

16. Manny's, Wood's, Ketchum's, and McCormick's reapers and mowers are used. Wood's has the preference on account of the self-raker.

menced, wood has trebled in price, and lumber has doubled in price. There is no land being cleared here at present.

Wages to farm laborers, by the day, are commonly $1 25. Now, in harvest, they are $2 50, and by the month from $20 to $26. In former years, before the war, wages have been but about one-half the present rates.

This section of country does not need under-draining. I think some general system of agricultural education among the masses of farmers, would greatly advance the agricultural interests, but I cannot suggest a plan for such education.

FROM CASS COUNTY.

NO NAME GIVEN—COMMUNICATION DATED AT EDWARDSBURGH.

This section of country has been cultivated about thirty-five years. This immediate vicinity is prairie, surrounded by timber and openings, interspersed with numerous little lakes and marshes. The prairie soil is a black, sandy loam; openings of a lighter kind of soil, and more sandy.

The principal crops are wheat and corn. The average yield per acre, at first, was large, with but a small amount of labor; but of late the yield has been much diminished, from constant cropping without resorting to clover or manure. At first, the average yield of wheat was twenty-five bushels per acre; now twelve or fifteen. Corn, at first, sixty bushels per acre; now forty. This decrease I attribute to the constant wear of the soil, without rest or seeding.

For years almost our only variety of wheat was that known as the Wabash. It yielded well, and was of good quality, but at last the insect known as the Hessian fly began to attack it, and to such an extent that its farther propagation seemed useless. Then followed several kinds of white wheat, which in turn were attacked by the same insect, and their further propagation abandoned. Then followed the Mediterranean, an early variety, which contines to be grown with success at the present time. The earlier the crop ripens, the less liable it appears to be to the ravages of the insect. The different varieties of white wheat give, when unmolested by the insect, a larger yield per acre than the red.

Hay has not been grown for market to much extent in this vicinity, except that upon the marshes. The ruling price is six dollars per ton.

The average price for wheat has been about one dollar per bushel; corn, fifty cents; oats, twenty-five cents; potatoes, twenty-five cents. The wheat and corn crops are those mostly relied upon for market. At first, the wheat crop was by far the most profitable, but of late the corn crop has taken the lead, in consequence of the greater certainty of a full crop.

The only kind of fruit cultivated in this section to much extent is apples, which grow finely, and bear a good price. They are produced for the Chicago market, mostly, and bring about forty cents per bushel, on an average.

Root crops are not cultivated to much extent in this section. I have often asked farmers why they do not raise roots for feeding, but from none of them do I get a satisfactory answer. Our soil is well adapted to the growth of most roots, and they could be raised at a less cost, for the same amount of nutriment, than grain. In this section, grain is the great staple for market. The number of horses and cattle raised for market is comparatively small. Sheep have taken the lead of all other kinds of stock for profit, since the first settlement of the country.

Beef and pork are mostly sold on foot. The price for beef has been about two dollars and fifty cents per hundred, live weight; hogs, three to five dollars per hundred, live weight; fat sheep, three to six dollars per head. Mutton can be produced cheaper than the other kinds of meat.

There is not enough of dairying in this section to establish a price for the produce in our market towns. There are no cheese factories in this vicinity.

FROM GENESEE COUNTY.

BY F. H. RANKIN, OF FLINT, SECRETARY OF THE GENESEE COUNTY AGRICULTURAL SOCIETY.

At the last meeting [this communication is dated Dec. 13, 1864,] of the Executive Committee of the Genesee Co. Agricultural Society, your circular "To the Farmers of Michigan" was under consideration, and answers to most of your questions were agreed upon, as follows. The replies may be regarded as relating generally to the county at large, rather than to any particular locality of the county. The replies might be modified in some instances, if their application were confined to particular townships. On some of the queries, the Committee did not possess the information requisite to enable them to answer correctly:

1. Cultivation commenced here about 40 years ago; has been general about 28 years. Soil—mixture of clay, sand and gravel; dry and well drained; most of it wood-land—oak, maple, beech, pine on the streams.

2. The principal crops are: Wheat, average yield per acre 15 bu., decrease from insects and open winters, one-fourth; corn, average yield per acre 40 bu., increase by cultivation one-fourth; oats, average yield per acre 40 bu., increase by cultivation one-fourth; potatoes, average yield per acre 100 bu., decrease from rot one-fourth; hay, average yield per acre 1½ ton, increase by cultivation one-fourth. Of white wheat, Soule's is most productive. Canada Club failed. Of red wheat, the Velvet Mediterranean is best. On clay soil white wheat has a tendency to turn red.

3. Wheat costs to raise, $1 a bushel; corn 40 cts.; potatoes 30 cts.; oats 30 cts. The corn crop is most profitable; next hay. A large proportion of the crops is consumed on the farm; of wheat, about one-half is sold; of other crops, about one-fourth.

4. All kinds of fruit suited to the climate of Michigan, are cultivated here. Apples are the most profitable. Fruits are generally more profitable than any other crops. Apples have averaged 50 cts. a bushel; sell for the home market.

5. Root crops are considerably cultivated. The principal kinds are the ruta baga and carrot—the former for cattle and sheep, the latter for horse-feed. They are considered profitable and useful crops, and the climate and soil of the county are well adapted to raising them.

6. Cattle are considered the most profitable farm stock.

8. Beef from grade cattle, can be made cheaper than any other meat.

9. The annual yield of butter per cow, is 125 lbs.; of cheese, 250 lbs.

10. The cost of butter may be put at 15 cts. per lb.; of cheese, 10 cts. Cheese is not made on the "factory system."

11. For beef, the short-horn or Durham, crossed with "native," is preferred. For the dairy, grade. Stock has been much improved by the introduction of Durham blood; principally from New York.

12. Of horses, Morgans and Black Hawks are preferred, both for farm work and traveling. Horses 16 hands high, of 1,100 to 1,200 lbs. weight, are preferred in both cases. The breed of horses has been much improved by the introduction of Morgans.

13. The sheep kept are Spanish Merino, principally. The average weight of fleeces is 4½ lbs. washed; prices 30 cts. to $1 per lb. Sheep are not fattened for market. The introduction of Spanish blood, from Vermont and New York, has much improved the sheep previously in the county.

14. The most profitable swine are a cross of Byfield and Suffolk. They are killed at from 9 months to 18 months old; average weight 250 lbs.

15. We have mowing and reaping machines, thrashing machines, and a general variety of labor-saving implements; saving one-half the manual labor.

16. We have the Buckeye, Cayuga Chief, Kirby, &c., and combined reapers and mowers.

17. Corn-planters, grain-drills, and broadcast sowing machines, are all used here with the very best results.

18. The revolving horse-rake is the only kind here used.

19. Horse-pitchforks are used almost universally, with a saving of more than half the manual labor.

20. Hay-tedders are not used.

22. Manures are chiefly applied to the corn crop.

23. Plaster is used considerably.

24. Wood-land has advanced in value 100 per cent. in the last five years.

25. In clearing land the timber is usually burned up in log heaps.

26. The wages to farm laborers are $1.50 a day; $20 a month. In former years the average was $12 a month.

27. Experiments have been made in underdraining clay soils, mainly with wood and brush. The drains cost about 25 cts. per rod, resulting in very great benefit to crops.

28. As improvements, fences are most needed; and for the advancement of the agricultural interest, the dissemination of agricultural papers would be useful.

FROM GENESEE COUNTY.

BY SILAS D. HALSEY, OF GRAND BLANC.

1. The soil in this section has been cultivated about 28 years. It is mostly clay; is chiefly what is called oak openings, with some wet prairies, or as we call them, marshes. The kinds of timber are black-walnut, white-walnut, white, black and red-oak, basswood, hard and soft-maple, elm, and indeed all the varieties found in our North-Western States.

2. The principal crops are wheat, oats, corn, barley, hay, &c. The average of wheat per acre, for the whole time the land has been cultivated, would be about 15 bushels. Oak openings, when first broken, and until they are tilled well and manured, do not produce large crops of wheat, but the yield increases as the soil becomes mixed and manured. Corn yields from 40 to 100 bushels ears to the acre, according as the soil is adapted to it.

Hard clay we consider unfit to plant corn on. Sandy, loamy, or gravely soil produces the best crops of corn. Oats do well on almost any kind of soil, and will yield from 30 to 50 bushels per acre, according to the richness of the land and manner of cultivation. Barley has been raised to some extent in our section, but requires well cultivated and rich land to make a good crop, and the state of weather and time of seeding must be considered. Hay goes about 1½ tons to the acre, as an average crop. We have found the Soule's wheat to be as productive as any variety we can sow, and it brings the most in market. However, the red wheat stands the ravages of the midge better than any kind we have tried.

3. The prices of different kinds of grain have varied very much. Wheat, for instance, has sold from 50 cts. to $2.50 per bushel; oats from 10 cts. to 75 cts. per bushel; corn from 25 to $1 25 per bushel; barley from 37½ cts. to $1; buckwheat from 50 cts. to $1. The relative cost of putting in crops is, wheat $4 per acre; oats $3; corn $5; barely $3; buckwheat $3. Wheat is considered the most profitable, and it is the most largely raised for market. All other crops are raised for sale, and but a small proportion of the grain raised is consumed as feed. Oats and corn are almost the only crops used for feeding animals.

4. Formerly all kinds of fruit were raised in our section; but latterly we have nothing but apples, cherries, currants, and a few pears. The curculio in the plum, the hard winter and late frost on our peaches and grapes, the blight on our pears, has rendered them almost or quite worthless. Indeed apples are not as perfect as they were 20 years ago. The profits of the fruit crop I consider greater than those on any other crop the farmer can raise. Apples will sell at from 75 cts. to $1.25 per bu. at Flint, or at the orchard. Fruit has not been raised here as yet for any western market, as Milwaukee or Chicago.

5. Root crops were raised when the country was new, because a large amount of roots could be raised at little cost on new land, and they, or something in the shape of grain

were required to give heart to marsh hay, which was all the fodder used for cattle, then. But the raising of roots has been discontinued, and corn and oats, as feed, have taken their places. Ruta baga was the only root raised to much extent. We have tried the mangel wurzel, sugar-beet, &c., but the care and trouble to keep them through our hard winters, has led to raising grain, which is not attended with so much trouble,

6. Sheep we consider the most profitable animals on the farm. Some of our farmers, however, fatten cattle and hogs for market, and are well remunerated.

7. The price of beef has varied from 2½ to 6 cts. per lb.; pork from 3 to 8 cts.; mutton from 3 to 5 cts; butter from 8 to 50 cts; cheese from 8 to 16 cts.

8. I should think that mutton could be produced at the least cost of any meat.

9. The average annual yield of butter per cow is about 150 pounds.

10. It costs 12 cts. a pound to make good butter, and perhaps cheese can be made for 8 cts. Cheese is not made in sufficient quantities to warrant the outlay attending the factory system.

11. The most profitable cattle for beef are the Durhams. The *grades* (common and Durham cross) are generally the best milkers, as far as my experience goes, although some of the full-blood Durhams are first-rate milkers. Oxen of the common blood, I think, are the best for working. The Durham cattle have been introduced here, but as a general thing, the farmers think they will not pay, and they are not patronized as a general thing. The Durhams introduced here were obtained of the Livingston County Stock Association, in Western New York.

12. The *grade* horse—Black Hawk or Morgan crossed with the large common or English mares—make the horses best adapted to the farm, and the Black Hawk, as pure as he can be got, the best for light business on the road. The Black Hawk and other Morgans have been introduced here to some

extent, and are very highly prized. A farm horse should be 15½ or 16 hands high, and should weigh 1,200 lbs.; 1,000 lbs. will do for a horse for light business. Horses should have weight for heavy draught, such as plowing, or heavy team work on roads.

13. We have the Paular Merino crossed with the common sheep. The average weight of the washed fleeces is about 4 lbs. each. The prices have varied from 25 cts. to $1 per lb. The clip of this year (1864) is all that ever brought the latter price. It would be fair to say it varies from 25 cts. to 75 cts. We have been in the habit of selling fat wethers for the market. They have brought from $2 to $4 per head after shearing. For wool, the Merinos are the most profitable, but for mutton, the Leicester and South Down are preferable, both for the larger amount of meat and the quality of the mutton.. The Paulars were introduced here a number of years ago, and crossed with our common ewes, which raised the quantity and quality of wool—the quantity from 2½ and 3 lbs., to 4 and 5 lbs., besides increasing the value of the wool. The breeding stock was obtained of breeders in Livingston county, New York. The Wards, of Bloomfield, and Hillman, of Avon.

14. The breed of swine considered most profitable here is Suffolk, because they fatten more readily than the larger breeds, and mature younger. They are generally killed at one year old, which age affords the best pork for family use.

15. We have thrashing machines, mowers and reapers, corn-planters, grain-drills, broad-cast sowing machines, horse-pitch-forks and horse-rakes. Some of the above machines I consider labor-saving machines, and probably will do the work of six men, with one man and a span of horses. The mower is a wonderful help, which the farmer this season would hardly know how to dispense with. This same remark will apply to the reaper. Horse-pitchforks are of more doubtful benefit, but I am not fully *posted* on them, although there are some in use in our vicinity. I think they are liked by those who have them.

16. Almost all kinds of mowers and reapers are used in our neighborhood. All are good, but the Buckeye, as a mower, is preferred. The reason is, the bar can be folded up, and the cutter-bar and knives are more easily adjusted and shifted, and they are likewise very light of draft.

17. There are few corn-planters, grain-drills, &c., in our neighborhood. Those who have them like them.

18. The Revolving horse-rake is all we have used in our vicinity.

19. There are some horse-pitchforks in our neighborhood. The short ones are the best liked. They will be very useful in some places, such as filling a large bay or mow.

20. Hay-tedders I have never seen. I think there are none in our vicinity.

21, 22, 23. Stable and yard manure is used in different ways by different individuals. Some heap it in some convenient place and let it rot until it is fine, and then use it as a fertilizer. The common way is to put it on the wheat fallow after harvest, and plow it in. It will increase the yield, say 5 bushels to the acre. This is merely guess-work, however. Plaster has not come into general use. Some, however, are begining to use it sparingly—with what results I do not know. I have used some, and thought it benefited the crop very much. Ashes have been used to some extent, beneficially.

24. Wood-land has advanced in value from $12 to $30 per acre. Lumber, common pine, has advanced from $6 per M. to $15 per M., and every other kind in proportion.

25. In clearing our land, we use the rail timber for fencing. The rough logs we saw up with a horse-power, cross-cut saw, for stove wood, as we have no saw mills handy, and all our timber is hard wood.

26. Farm laborers ask from $15 to $20 per month by the year, and in harvest from $1.50 to $1.75 per day. We formerly paid $10 per month, and $1 per day in harvest.

27. There has been a good deal of under-draining done in this vicinity. Some drains are filled with brush, which make a

good drain, that will last and carry of the water for a number of years. Some take poles, say three inches in diameter, and lay on each side of the ditch, and saw blocks 18 inches long, from some free-splitting timber, and rive out shingles half an inch in thickness, and lay them cross-wise on the poles; put on straw and cover with earth. This will last a life-time. I laid down such a ditch last spring. It cost 31 cts. per rod.

FROM GENESEE COUNTY.

BY REV. A. B. PRATT, OF GENESEE.

The following answers to your inquiries relate to this town only.

1. The land has been under cultivation about 30 years; the township embraces nearly every variety of soil and timber.

2. The principal crops are wheat and corn. There has been a decrease of the former, owing chiefly to the ravages of the midge, and an increase of the latter.

4. Apples are the principal fruit; the prices range from 25 cents to $1 per bushel.

5. Root crops are cultivated only to a very limited extent. In 1862, I raised about 750 bushels of the Swedish turnip, or rutabaga, on three-fourths of an acre of ground. The crop, with straw, would be equivalent to 15 tons of hay, or at the price of hay that year, $150. The turnips were raised at a cost not exceeding $32, when gathered and stored. The account would stand something like this: cost of raising, $25; gathering and storing, $8; straw, $8; extra expense of feeding, $25; total, $70; which subtracted from the value of the turnips and straw, shows a gain of $80, from the three-fourths of an acre.

6. Beyond the stock needed on the farm, sheep are most profitable.

8. Mutton can be produced at a less cost than any other meat.

11. Short-horn cattle are most profitable for beef; Devons for work.

12. The Morgan horses are the best as roadsters.

15. We have thrashing machines, reaping and mowing machines, grain-drills, seed-sowers, and horse-rakes. By their use, we obtain the same amount of products for three-fourths the labor that would be required without them.

16. The Cayuga Chief, Buckeye, and "Screw power" mowing machines are used here. Each are thought best by their respective owners.

19, and 20. Horse-pitchforks are but very little used, and hay-tedders not at all.

21, and 22. The solid excrements of domestic animals are collected in the ordinary way in barn-yards, and applied mostly in an unfermented state, to all crops.

23. Plaster is used to a considerable extent. It costs from $6 to $8 per ton. Its results are very favorable on all crops.

28. We need sub-soil plows, horse-hoes, carrot-weeders, and an improved cultivator.

FROM HILLSDALE COUNTY.

BY W. J. BAXTER, OF JONESVILLE.

This region (the northern part of Hillsdale county) has been cultivated in part since 1832, and has been brought more and more under cultivation ever since. The soil is generally dry, stony and gravelly, with but little clay. It contains considerable lime. Much of it is what is called opening land, covered by small white and yellow oak, and in some parts, burr oak, while along the streams, maple, elm, basswood, &c., prevail. Some parts are wet and heavily-timbered with oak, and some whitewood, beech and maple. The great body of the northern part of the county, was white oak openings. Wheat, corn, oats, potatoes, &c., are the principal crops. In the early history of the county wheat yielded, generally, 40 bushels to the acre. Now, and several years past, it averages about 20 bushels of the best quality of white wheat. White wheat is the prevailing crop here, and is about as sure and productive as red. Corn yields about the same as at first, say 60 to 80 bushels per acre. The soil is good also for potatoes, &c.

It is not possible to say what has caused the deterioration in the productiveness of wheat crops. The fact is indisputable, that land under apparently the same condition, yields but about half as much as it did up to 1840, or later.

Wheat has run from 50 cents to $1 75 per bushel—perhaps 90 cents would be an average price until within a year or two past. About 50 cents for corn would be an average price, though it has been sold as high as $1 50 in some years. Oats 25 cents. Potatoes 25 cents. These prices would be a fair average until since the war commenced. Clover hay $6 per ton; timothy $8 per ton; marsh hay $3 per ton; average prices prior to the war.

Wheat has been the principal crop until of late years, when more attention has been given to wool and stock-raising. Wheat is still the great staple. Wheat, wool and potatoes are the only products, of which a large proportion is sold to go out of the county. Three-fourths of the wheat raised goes off in the grain—a small proportion in flour. Seven-eighths of the wool goes off in the fleece, and the balance is manufactured in the county.

Corn, oats, hay, &c., are mostly fed out in the county. One-half of the potatoes are sent off, either to Toledo or Chicago. Apples are the principal fruit raised, and those not largely for foreign markets, though they might be made a very profitable crop. Peaches are sent, some years, in large quantities to Chicago, but of late years the crop is uncertain. Apples generally range from $2 to $3 per barrel for winter varieties. Peaches from 50 cents to $2 per bushel, according to quality and abundance.

Root crops are not much cultivated.

Sheep are the most profitable live stock. Next, at the present time, horses; 3d, cattle; 4th, hogs.

FROM KALAMAZOO COUNTY.

BY FRANK LITTLE, SEC'Y KALAMAZOO COUNTY AGRICULTURAL SOCIETY.

1. Kalamazoo county was settled in the year 1830. Very little, if anything, was done that year in the way of cultivation. The next year (1831,) ground was broken more or less throughout the county. A portion, therefore, of the soil of this section has been cultivated thirty-three years. Its original character was what is denominated "prairie," "oak openings," "timbered," beech and maple, and "marsh" land, in the proportion of say two-tenths prairie, six-tenths openings, and two-tenths timbered and marsh. It may be properly termed dry. The prevailing species of trees were the varieties of oak, walnut, beech, rock and white maple, ash, elm, cherry and whitewood.

2. Winter wheat, corn, oats, potatoes and hay, are the principal crops raised here. The average yield from the first, as near as can be estimated, has been, for wheat, say fifteen bushels; corn, forty-five; oats, thirty; potatoes, one hundred; and hay, one ton per acre. Wheat, more than any other crop, unless it may be potatoes, has experienced many vicissitudes since the early settlement of the county. These changes seemed to come by periods, in which the crop would almost utterly fail for two or three years in succession, and entirely baffled the skill of our best farmers to devise a remedy. It would be difficult to state how much the increase and decrease has been. Wheat has suffered mainly from ravages of insects, rust, and chess, or cheat. The crop is now, however, considered a pretty safe one on fallows, or where it is green-manured with clover. White wheat is not as certain a crop as red, being more subject to injury from the Hessian fly, though the yield is thought to be greater from a given number of stalks, and, of course, the quality is much superior, and the price greater per bushel. Upon an average, there is but little difference in the yield of the two varieties per acre, though a good crop of white will yield all of five bushels per acre more than the red. A growth of from thirty-five to forty bushels per acre has been no uncom-

mon occurrence upon choice land, and under other favorable circumstances, from the first settlement to the present time.

3. The price of wheat has ranged from thirty-seven and a half cents to two dollars per bushel. Ordinarily the average price has been one dollar. Oats, thirty-one cents; corn, fifty cents; potatoes, twenty-five cents; hay, six dollars a ton. The surplusage of wheat is sold and shipped to market. All other products are held mainly for home consumption. In regard to the relative cost of the different crops, wheat and grass may be set down as by far the most profitable; corn the least so, owing to the excess of tillage required over other crops, and the low price, comparatively, at which it sells. Farmers have been divided in regard to the policy of planting very much corn, and although the soil is much benefitted by the cultivation, yet the scarcity and high cost of labor, the uncertainties attending its growth and maturity, and its being so entirely unremunerative, are difficulties which, when weighed against all the advantages, have resulted in keeping its growth down to the lowest minimum of the necessities of each cultivator and of the locality where it is grown.

4. Apples and peaches are cultivated more extensively than the other fruits. Pears, plums and cherries are grown to some extent; also grapes, strawberries, raspberries, blackberries, gooseberries, currants, &c. Apples and peaches have become articles of commerce from this section, and in favorable seasons the crop of fruit has been a profitable one, especially that of peaches. Much more might be realized, but our farmers, as a general thing, are so much absorbed in grain-raising that the orchards are sadly neglected, being left after the first planting, mainly to the care of nature and the women and children. The orchards prove to be very convenient for grazing purposes, and horses and cattle are turned in, much to the detriment of the growing trees. Prices of fruit have averaged about as follows: Apples, one dollar per bushel; peaches, seventy-five cents; strawberries, twelve cents a quart. They have mostly been sold in Chicago.

5. Root crops are not cultivated to great extent in this section. In order to be grown successfully, two things are indispensable—high culture and favorable weather. In England, under the "four course," or "four shift" system, turnips are made the basis of all other crops. Through their successful growth, and consumption by sheep on the land where they are grown, the soil is made rich, producing abundant harvests of each of the three succeeding crops—wheat, barley and grass. They may really be termed the key that unlocks earth's treasures to the English farmer. But the climate of England is mild, equable and humid, while ours is changeable and dry. The severe periods of drought we experience almost every summer, would be fatal to the successful cultivation of root crops, which thrive better in cloudy and moist weather. Until our population becomes more dense, and a higher system of farming is inaugurated, with the necessary adjuncts of cheap labor, manures and irrigation, I am inclined to the opinion that root crops cannot be grown successfully or profitably in our State.

6. Beyond the number of horses, cattle, etc., essential in carrying on the farm, sheep have undoubtedly been the most profitable of all live stock. They have been kept mainly for wool, but few, comparatively, being fattened for market. I I might add, that for the last three or four years the raising of horses, cattle and swine, for sale, has received much more attention than formerly, and prices have very much advanced.

7. Prices have averaged as follows: Beef, three dollars; pork, four dollars; and mutton, three dollars per hundred. Butter, twelve and a half cents, and cheese eight cents per pound.

8. Of the three kinds of meat enumerated above, pork can undoubtedly be produced at the least cost.

9. It would be difficult to state the average annual yield of butter and cheese from a cow, as there are no extensive dairies kept in this section, and the butter and cheese-making interest among the farmers is entirely a secondary one, and is left to take care of itself, pretty much.

10. I am unable to state the relative cost per pound of butter and cheese. But little attention is paid to cheese-making. There is none made by the "factory system" in this county, to my knowledge.

11. The Short Horns are considered the best breed of cattle in this vicinity for all purposes. Many fine herds of pure-bloods have been introduced into this section, with marked advantageous results. The breed termed "native," is fast disappearing from off the farms, and improved stock is taking their place. The importations of cattle have been mainly from the States of New York and Ohio.

12. The Morgan breed of horses is much preferred with us, and seems best adapted to farm work and for general use. Their average size is about fourteen hands high; weight, one thousand pounds. In the early settlement of this county, heavier horses and oxen were required. But for general use upon the farm, and as roadsters, a horse combining the characteristics of the Sherman Morgan, or Black Hawk, being of a neat, compact form, good travelers, possessing hardy constitutions, and strong digestive organs, making them easy keepers, is of all horses, unquestionably the most economical in point of cost of keeping and endurance. Some other breeds have been introduced here with indifferent success. The formation at Kalamazoo, six years ago, of the society known as "The National Horse Association for improving the Breed of Horses," has done much toward the introduction of the best stock.

13. The French and Spanish Merinos are the only breeds of sheep kept in this locality to much extent. Average weight of washed fleeces, four pounds; average price per pound, forty cents. No sheep are kept exclusively for mutton, or fattened for market. A very few South Downs and Leicesters have been brought into the county.

14. There has been but little attention paid to the breeding of swine heretofore. The original breed was what is usually

termed "pointer," and was from the State of Indiana. They were a long-nosed, long-legged, slab-sided, predatory race of lean and incessant squealers, ravaging the corn and wheat fields of the early settlers, hated by all mankind and canines, and the only wonder and regret is, that they were not "dogged" to death, and the breed thus exterminated. The introduction of a few Leicesters and Berkshires about the year 1840, gradually modified the original temper and characteristics of the "natives." Later, the Suffolk, Essex and Chester-White have been introduced, with favorable results. The Chester-Whites are at present the favorites. They are a very quiet, peaceable variety, and fatten easily. Swine are usually slaughtered at the age of eighteen months. The average dressed weight is about two hundred and fifty pounds.

15. Good implements in husbandry are almost as indispensable as the soil itself. To attain successful results the soil must be well cultivated and thoroughly pulverized. One of the most marked advances in modern agriculture has been the wonderful improvements and inventions of new varieties of farm tools and machinery. What a providence, surely, to the American farmer during the present scarcity of labor—the war taking off such a large proportion of the best bone and muscle of the country—that *one* man, through the aid of improved implements for planting, cultivating, harvesting and threshing, can do the work of *ten*, at least, under the old-fashioned mode. Almost all varieties of labor-saving implements are now used generally by the farmers of this section, and with good results. Ploughs, harrows, cultivators, rollers, horse-rakes, stump-machines and a number of the smaller utensils are manufactured here, both for home use and for shipment to other markets.

16. Several kinds of mowing and reaping machines, both single and combined, are used in this section. They are now the main reliance for cutting both the hay and grain crops. The most popular kinds are the "Seymour & Morgan Self-raker," "Buckeye," "Eureka," "Quaker," "Kirby," "Ball,"

and "Howard"—all combined machines, I believe. In regard to preferences, it is a noticeable fact, that every farmer believes that the machine he happens to own is decidedly superior to all others; so that a jury of twelve men, owning different machines, however conscientious or upright they might be, could hardly agree as to which one of all was clearly the best. The same would be true, I suppose, with the manufacturers.

17. Wheat grain-drills are being used to some extent, and, as far as has been ascertained, the result has been highly satisfactory. Drilled wheat is found to endure a freezing-out winter much better than if sown broadcast, the roots being much deeper in the soil, and therefore more firmly attached. Neither is it as much affected by drouth as that sown broadcast, and less seed also is required. Wheat-drilling will soon be pretty generally practiced, especially upon all thoroughly-subdued farms, where the drill can be made to work well. The kinds most used are the "Star," "Buckeye," and "Keystone"—all good machines.

18. Hand-raking of hay is not now practiced where the ground will admit of the use of horse-rakes. These are generally the common, wooden-tooth, revolving. One man and a horse, on fair ground, can rake from twelve to sixteen acres a day, at an average cost of two dollars and fifty cents a day, or about sixteen cents per acre.

19. Horse-pitchforks are not used to much extent in unloading hay. It is not thought that manual labor is economized very much by their use. Several agents for various styles have visited this section recently, with the forks for sale. What success they have met with I am unable to state.

20. As the grass crop is cut mainly by mowing machines, which leave the hay evenly spread upon the ground, "hay-tedders" are not used.

21. Our farmers are at last awakening to the importance of manures, and the true value of them even upon comparatively new lands. In the early settlement of the county, owing to scarcity of labor, and the universally prevalent idea

that the land was of itself too rich, and could never wear out, the accumulation of rotted straw and the excrement of animals about the barn and out-buildings, was considered in the light of an annoyance and a great evil. Many barns, after a few years' use, were moved to new ground, to be rid of the difficulty of wading through a depth of three or four feet of manure. An instance occurred of my knowledge in the year 1837, where an intelligent and well-to-do farmer from New England (where manure is properly appreciated,) purchased an improved farm in this county, with such an incumbrance in the barnyard. How to get rid of the nuisance was the question. One plan was to move the barn (the usual practice.) Another, to dig an immense pit near, and submerge the entire mass forever from sight. But fortune at last favored the occupant, as he thought. A weak, simple-hearted neighbor, by dint of much persuasion, and the promise of a man to help load, was induced to carry away the troublesome and unsavory mass to his own farm—an all winter's job—and thus a riddance was effected, much to the joy of the owner. Manures are now pretty generally saved, and applied to corn and wheat lands.

22. The application of manure upon wheat land has been attended with marked success, increasing the growth and yield nearly fifty per cent., and doing much to ward off the attacks of the Hessian fly.

23. Plaster (gypsum,) is used extensively as a top-dressing for clover—in a dry season increasing its growth fully one hundred per cent. It is obtained mainly from Grand Rapids, Michigan, at a cost, delivered here, of about seven dollars per ton. Public opinion is somewhat divided in regard to the value of gypsum, when applied to other crops besides clover. It is thought that potatoes, corn, garden vegetables, and all kinds of vines, are benefitted by its use. Still, it is not generally used for these crops. Much, of course, depends upon the season. If a dry one, its benefits are more marked, as it is not so much a fertilizer as a salt, inducing chemical action in the soil, and condensing moisture from the atmosphere. The other

concentrated manures enumerated in the inquiry, are not used in this locality, to my knowledge.

24. Wood-lands and forests lying in the vicinity of all villages, or where a ready market can be obtained, have advanced within the last five years fully fifty per cent. or more in value. Firewood and lumber have also doubled in price within the same period.

25. It is but recently that any considerable attempt has been made to market the timber upon lands being cleared for cultivation. Usually the trees were first deadened, or, as it is termed, "girdled." The land was then ploughed and sown to winter wheat. After the crop was taken off—though in many instances three or four years elapsed—the trees were all chopped down, drawn into large piles, and burned. Like manure, these noble old oaks that had breasted the storms of a century, were viewed in the light of an evil, to be rid of as might best offer; and he was deemed a lucky man, whose farm, located on some broad, open prairie, was comparatively free from them. Many instances have occurred where farmers whose area of cultivated lands was already much too large, far beyond their capacity to manage successfully, have given all the wood, rail and building timber standing upon the land, and a money compensation of from five to eight dollars per acre, to clear up, it may be, nearly the last acre of forest-land they owned. How true is the old maxim, "It is much easier to destroy than to build;" and a tree that has required a period of time equal to six generations of men to mature and bring to its majestic grandeur and proportions, is ruthlessly cut down by some pitiless vandal in an hour. But this wanton waste and destruction of timber has in a measure subsided, and what now remains is cared for with increasing solicitude. Wood has sold, the past three years, at an average price of three dollars per cord. Hewn timber, eight inches square, at eight cents per foot.

26. Farm laborers' wages, by the day and month, vary with the season at which they are employed. Present wages are as

follows: Winter, per month, $18, and per day, $1; summer, per month, $25, and per day, $1 50. Formerly wages were, per month, winter, $12; summer, $16 to $20; by the day, from 75 cents to $1 50.

27. No experiments have been made in underdraining in this county, to my knowledge, either with tiles, stones, or other material.

Wheat being the principal crop raised in this section, and also throughout the southern portion of the State, it is important that any facts bearing upon its cultivation should be well understood and widely disseminated. The census returns for 1860, set down the crop at upwards of eight millions of bushels for this State. An average crop at this time will undoubtedly exceed ten millions. The magnitude of this interest should not be underrated. New or natural soil seems best adapted to the growth of the wheat plant, possessing all the organic and inorganic elements necessary to its growth. But as cultivation extends, the area of new lands, of course, diminishes; the main reliance, therefore, must be upon artificial soils, prepared by fallowing or green manuring. Of the value of other manures, and how far their use might be extended with profit, I am incompetent to determine, but will offer a few practical suggestions upon the preparation of the soil, time of sowing, &c.

And, first, plough deep, and let the after cultivation be as thorough as possible. In fallowing, the field should be ploughed twice, and three times, if possible, before the time of sowing, and harrowed frequently. Clover sod should be turned over by the first of July, at the latest, and then be stirred by the cultivator at short intervals, until seeding time. *Thorough and complete pulverization* is the great object to be sought in the preparation of soil for wheat. Let no farmer deem it of small importance, and fail for the want of a little energy and perseverance. Our best wheat lands, unless great care is taken, are apt to clod into lumps that bake in the sun, and, in that condition, they are no more available for the nourishment of plants than so many stones. The fibrous roots cannot penetrate the clods, and their power to benefit vegetation is therefore wholly lost; and, furthermore, occupying almost the entire surface of the ground, they encroach very much upon the standing room of plants.

Frequent cultivation through the summer, and especially in a humid condition of the soil, will in a great degree overcome this evil, and the ground will be brought into a friable condition, in which all its fertilizing particles can be made available. I would urge the importance of this matter, which is no speculative, impracticable theory, upon the farmers of Michigan. Let deep tillage and thorough cultivation be inscribed upon the "bells of the horses," and upon all implements of farm husbandry. As a general rule, wheat should be sown in our climate about the tenth of September. The best of seed should be selected, and whether drilled, or sown broadcast, no pains should be spared to get it in well.

The foregoing brief suggestions naturally lead to the consideration of another question intimately connected with the general subject of agriculture, as regards all manual operations, and that is, the number of acres an ordinary farmer can cultivate properly and successfully each year. That fully fifty per cent. of all the improved lands in the State are cultivated each year without profit, and even at a positive loss, is probably true. In an article entitled "Observations on English Husbandry," by Hon. Henry F. French, of Boston, it is said: "The English farmer is not usually the owner of his farm, but pays an annual rent for it of about ten dollars an acre. How can the English farmer sustain the heavy burdens of rent, taxes and costly manures, and make a profit beyond his support? How can he steadily increase the fertility of his soil while he is annually reaping crops so valuable? Ask an English farmer how much he pays for manures, and he will very likely reply, 'All the money we have left.' Fifty dollars an acre is given as the average capital necessary to conduct a Lincolnshire farm.

"It is obvious that the system of farming must be very thorough and successful to meet all the large expenditures. It is found that leased lands in England, as a general thing, are better cultivated than lands occupied by their owners, who are of the same rank as farmers. In passing a farm half drained, and with crops feeble and uneven, it is the common remark, 'That man owns his farm; if he paid rent he could not afford to farm like that.' Or, 'That farmer ought to have his rent doubled, and then he would be compelled to raise better crops.' Land cannot be well cultivated without a liberal working capital, and a man of moderate means, who invests all his money in land, of course has nothing left with which to work it properly."

Liebig, in his "Modern Agriculture," says: "The American farmer despoils his fields without the least attempt at method in the process. When it ceases to yield him sufficiently abundant crops to make his ends meet, he simply abandons it, and, with his seed and household effects, betakes himself to a fresh field."

Here we have the whole system of western spoilation (not farming) in a nut-shell. In the early settlement of the West, when labor was not abundant, the land unsubdued, and prices of all kinds of produce low, there might be found some excuse for the great breadth of operations and the "skinning process." But at this day and age of near markets, remunerative prices, lands thoroughly subdued, and the wonderful improvements made in farm implements and modes of farming, it seems almost a crime against humanity for a poor, shiftless, incompetent farmer to settle down upon and monopolize one, two and three hundred acres of valuable farming land, situated, it may be, on one of our beautiful and fertile prairies, and scatter his incoherent futile efforts over the whole tract, to his own positive detriment and that of the Commonwealth. Yet these men are, in their own estimation, *great* farmers. You will see them in groups at any public gathering—say a fall election—talking about the number of *acres* of wheat they have sown. It is seldom you will hear them discoursing about the condition of the soil, or the number of *bushels* of anything they have raised. He is a small farmer, they say, and a man of no account, that does not put in one hundred acres of wheat each year, at least. Although they may never realize more than half a crop at best, and the land is yearly growing poorer, yet their cry is "acres, acres," without any reference to the fitness of the soil, or their own capacity of muscle and brain to produce a crop. From the want of any systematic plan of operations, results are never uniform or reliable. The land is "skimmed" over from year to year, and the wolf is barely kept from the door.

How many western farmers invest all their capital at the outset in land, work hard all their days, with few conveinences, poor buildings, no shelter for their animals, no implements, no schools for their children, no social advantages or intellectual improvement and culture, harrassed with debts they cannot pay, with physical constitutions prematurely broken and enfeebled, they die at last as they have lived, poor and comfortless! Yet the poor man's fate is sealed the moment he takes up the life of a farmer under such circumstances. Such a life has few charms, and how sad the effects of overtasking the body and leaving the mind to become a barren waste!

There can be no doubt that the incessant drudgery and plodding routine of a farmer's life, unless great care is taken, acts perniciously upon the physical and mental system. How many there are that live on from year to year, the mind, the heart, all sterile and uncultivated, with no intelligent thought, no breadth of view, no looking up through nature to nature's God—He who "visitests the earth and waterest it,"—who "clothes the pastures with flocks,"—who "makest the valleys green with corn," and "crownest the year with His goodness"—a mere mechanical existence and routine of eating, and working, and sleeping, barren of the great results for which man came into the world; a labor without an object; an accumulation without a purpose; a life without a joy.

FROM KALAMAZOO COUNTY.

BY A. T. PROUTY, OF KALAMAZOO.

This section of the State has been cultivated about thirty years; and the soil is various, being originally prairie, burr-oak and white oak. Consequently the soil is sandy loam, clay and gravelly clay, and is deemed of excellent quality. The woodland consists of the sugar-maple, beech, basswood, elm and white-ash.

The principal crops are wheat, corn and oats. The average crop of wheat has been, I should think, not over fifteen bushels per acre, although it frequently amounts to thirty bushels, when the land is well tilled. The corn crop is variable, depending entirely upon the way it is cultivated. I have a field of about four acres, a black, sandy loam, resembling prairie soil, on which I have raised corn for twenty years in succession, often obtaining as high as eighty, and one year one hundred and three bushels per acre. My way of raising corn is as follows: I plant as soon as possible after the ground is plowed and harrowed. I mark the ground both ways, the rows four feet apart. As soon as it is fairly up, I cultivate with a corn-cultivator both ways, although there are no weeds. I use a three-tooth shovel plow the remainder of the season. I never use a hand-hoe, and never find it necessary to do so; but the rows should be straight, and the cultivator should always go in advance of the weeds.

The wheat crop has always been regarded here as the principal crop for a foreign market, varying in price from 37½ cts., at an early day, to $1 50 per bushel. Corn and oats are used mostly for home consumption.

I have an orchard of apple-trees on the ground where I raised the corn above mentioned. The trees have been set twelve years, and are thirty-six feet apart. Last year (1863) they yielded about one barrel of apples per tree, selling readily for $1 50 per barrel. Apples from here are sold for both the eastern and western markets.

Strawberries are extensively cultivated here for the Chicago and Detroit markets.

Much attention is being paid to labor-saving machines. Our wood is cut in the forest by horse-power; our grain is cut by horse-power, and our hay is cut and raked by horse-power.

The revolving hay-rake is generally used, saving the labor of at least six men. Grain-drills are much in use, and are generally liked where there are no stumps.

Liquid manures are not used, and it is but a few years since some of our farmers moved their barns to get away from their manure-heaps; and many of them now burn up their straw to get it out of their way.

The manure from the yard and stable is usually applied to the corn-field. Plaster is used to some extent on the hay-fields. Ashes are used only for making soap, and then either left as an unsightly heap or to fill up some bad place in the highway.

Forest-lands have advanced in value rapidly in the last five years, having risen from ten to even forty and fifty dollars per acre. Wood has risen in the same time from $1 75 to $4 and $5 per cord.

Under-draining has been done with tiles here, to some extent, with good results, and in all cases the best of results have been produced by under-draining, either by brush, stone or tiles.

The greatest improvement made in this vicinity is in extracting the stumps and in clearing off the stone so as to apply horse-power machinery, which will enable us to spare more of our young men for the armies of the Union, thereby completely subduing that class of farmers who know no other way to till the soil but by the hoe and the bone and sinews of human beings under the lash.

FROM LAPEER COUNTY.

BY WILLIAM HEMMINGWAY, OF LAPEER.

1. The settlement and cultivation of this vicinity commenced about thirty-two years since. The south half of this county is mostly of oak opening land, slightly rolling, and tolerably dry. The soil is various, from very hard clay to light sand. There is some marsh land. The north part of the county is woodland. The growth is beech, maple, walnut, etc., and, in a large portion, pine of the first quality is the prevailing timber.

2. The principal crops are wheat, corn, oats, potatoes, barley and hay. The average yield would be hard to tell, as no statistics have been kept, except when the census is taken. There has been no decrease. There is much greater pains taken in cultivation now than formerly. As to wheat, there is a diversity of opinion respecting the relative quality of the white and red. All the varieties do well in this locality. Wheat this year is far better in this county than in any county south of us in this State. Winter wheat produces best on opening land.

3. It would be almost impossible to tell what have been the ruling prices, as they have varied much. For instance, wheat has ranged from 40 cents to $2; oats, from 15 cents to 90 cents; corn, from 20 cents to $1 25; potatoes, from 9 cents to $1 25, according to the supply and demand.

4. Apples are more largely cultivated than any other fruit. Pears, cherries, plums, strawberries, etc., etc., are cultivated to a considerable extent. Apples are considered very profitable. The price has ranged from 50 cents to $1 per bushel. Other kinds of fruit are not much in the market—they are cultivated for home use. We have a large amount of wild blackberries in this county. Hundreds of bushels are gathered annually, and sold at about four cents a quart.

5. Root crops are not made a leading staple with our farmers, although many cultivate them quite largely. The ruta baga and carrots are considered the best for cattle. They are considered profitable when cultivated with care.

6. Sheep are looked upon as the most profitable of live stock.

7. The price of beef has ranged from $2 to $8 per hundred; pork, from $3 to $10; generally about the same as beef; butter, 10 cents to 30 cents per pound; cheese, 6 cents to 25 cents.

8. Beef can be produced at the least cost of any meat.

9. It is impossible to tell what is the average yield of butter per cow annually. It will range from three pounds to ten pounds per week, according to the quality of the cow, and the keeping.

10. I cannot tell the relative cost of butter and cheese. Cheese is not made on the factory system in this vicinity.

11. Durham cattle are the most profitable for beef. Some prefer a cross or grade. Devons are considered best for the dairy. Some think a cross of Devon and Durham best. There are not many, if any, other cattle of distinct breeds in this vicinity. There is a different opinion as to working oxen; some prefer one and some another breed. Devons have been introduced into this section with very good results. They were obtained in Vermont. The same may be said as to the advantages of the Durham. I cannot say where they were obtained.

12. We have several varieties of good horses for all purposes. I cannot say which is the best. "Morgan," "Black Hawk," "Sampson," etc., etc., are good.

13. Spanish Merino sheep, and their grades, are the principal breed of sheep in this vicinity. There are some of the different breeds of long-wool and South-Downs, but they are not numerous. We have flocks of from 200 to 400, that average six pounds washed wool. The average of flocks will vary from four to seven pounds. Sheep have been fattened for market some, but not extensively—mostly wethers, three years old and over. They are considered profitable. The large-bodied sheep are considered to be the most profitable for mutton. The Spanish Merino is now the ruling breed here. They were introduced from Addison county, Vermont, and are mostly

what are called Paulars. I sheared my two-year-old ram June 6th, this year, and took from him 18¾ pounds unwashed wool, very nice and clean. His body weighed 89 pounds after he was shorn. He is descended from the Stickney, Robinson & Rich flocks, of Shoreham, Vermont.

14. There is not as much attention paid to swine as there should be. No distinct breeds are kept. Hogs are slaughtered at from twelve to eighteen months old, as a general rule; weight, from 150 to 500 pounds.

15. Mowers and reapers, drills and horse-rakes, are the principal labor-saving machines used here.

16. The Cayuga Chief, Buckeye, and the Ball mowers, are good. Some prefer one, some another.

17. Corn-planters are not much used. Grain-drills are used considerably. We have no broadcast sowing machines. The drill works well. Wheat drilled will produce enough more to pay for the labor of sowing. A machine is used for sowing clover and grass-seed and plaster, with good results. The names of the manufacturers I do not recollect.

18. The revolving and spring-tooth horse-rakes are used. The spring-tooth goes on wheels, and the operator rides while raking the hay. It is generally preferred.

19. Horse-pitchforks are not used enough to test their qualities. Last season (1863) was the first that they were used to much extent. They are generally liked.

20. No hay-tedders used. In plows and cultivators we adopt all the principal improvements of the day.

21. Not much attention is given to the saving of manure, except in a very few cases. It is thrown into the yards, and there left to leach and evaporate, and at such leisure as the farmer gets it is hauled to the land.

22. Stable manure is applied to corn and other spring crops more than any others. As to the ratio of increase in the crop from their use, I cannot tell, as no exact account has been kept.

23. Plaster is used at the rate of 50 pounds to the acre for

clover or wheat, and corn is plastered in the hill with good results. On clover it will nearly double the crop; on corn it adds one-quarter; on wheat the same. It costs $6 to $10 per ton.

24. The advance of price on wood-land has been but little in the last five years, say 20 to 25 per cent. Wood has advanced somewhat. Pine timber lands have advanced 100 per cent. in the last two years. Pine lumber is now worth from $9 to $20 per M.

25. In clearing land the trees are generally chopped for logging or for fire-wood, except pine, which is sawed into lumber of the different kinds.

26. Wages are from $18 to $25 per month for the summer season, and from $16 to $20 by the year. From $1 to $1 50 by the day.

27. Under-draining has been commenced in some places quite largely. Some use tile and some stone. The result is about the same. It is done more on low, wet or springy land than any other; but to a considerable extent on some uplands. I cannot state the precise cost. It depends much on the soil and material, &c.

28. Manures should be more cared for, and cattle and sheep housed and more protected from the storms. The agriculturist should be educated to know that much can be made from a small piece of land, if properly tilled. There is a great lack of economy in almost all branches of agricultural pursuits, and much could be done to improve them in nearly every particular. Too much land is worked for profit. There is too little agricultural reading. Too little interest is taken in fruit culture.

FROM MACOMB COUNTY.

BY C. F. MALLORY, OF ROMEO.

1. The soil of this section has been cultivated thirty years. East of this village the land is heavily timbered with beech and maple. The land is generally mucky, with clay; some parts are sandy, gravelly and wet. West, the land is more rolling, timbered, oak openings, interspersed with oak plains.

2. The principal crop has been and still is wheat. The amount sown has generally increased. The yield varies from 15 to 25, and in some cases 35 bushels to the acre. Both white and red are raised. The Mediterranean is the hardiest, and usually the most productive. Corn, oats, barley and spring wheat are raised in large quantities.

3. Wheat has sold at various prices, from 50 cents to $2 per bushel. The price here is usually 10 cents less than in Detroit. Spring wheat is 12½ to 15 cents lower than winter. Corn has varied from 30 cents to $1 per bushel; oats from 15 to 75 cents per bushel; barley from $1 to $2 per bushel. Wheat has been the most profitable. Hay has sold from $5 to $12 per ton. Probably not more than one-tenth of the hay is sold; the balance is fed out on the farm. About half the corn and two-thirds of the oats are sold. There is as much land devoted to wheat as to all the other crops.

4. Apples are the principal fruit, and a large extent of land is in orchard, and is very profitable. The apples are sent to Chicago and the eastern markets, and some to Scotland. An orchard of twenty acres will make as much net profit as one hundred acres in grain and hay. Apples usually sell at from 25 to 50 cts. per bushel. Peaches 50 cts. to $2 per bushel. They were all killed last winter. Pears 50 cents to $1 per bushel.

5. Swedish turnips, carrots and mangel wurzel are raised and fed on the farm. The latter are considered the best for milch cows. There is no market for them.

6. Sheep and horses are the most profitable, although beef cattle have been raised to a pretty large extent.

7. Beef sells at $3 to $6 per hundred. Pork $4 to $8. Mut-

ton $3 to $5. Butter 10 to 30 cents per pound. Cheese 8 to 15 cents.

8. Beef can be most cheaply produced, particularly in the fall, as young cattle will get quite fat on grass.

9. The average annual yield of butter per cow is about 100 pounds; of cheese, 200 pounds. Good cows will make from 150 to 200 pounds of butter.

10. There is so little cheese made in this vicinity that it bears a higher price in proportion to butter than is usual at the East. Last summer cheese was as high as butter. There is not cheese enough made for home consumption, and it is brought from Ohio and Western New York. Cheese is made on the old system, each dairy-woman making what she can when the weather is too warm for making butter.

The Durham, or Short-horn, and Devonshire cattle are the principal and favorite breeds. The former are preferred for beef, and the Devons for working oxen. The grades make the best milkers. There has been a great improvement by the introduction of good bulls from the State of New York.

12. The Morgan horse is considered the best for all purposes; but some large, heavy horses have been brought in from Canada—a mixture of French. From 14 to 16 hands high is desired, and 1,200 to 1,400 pounds weight, for farm work. Lighter horses will do well for traveling. The stock of horses has been very much improved within twenty years.

13. The French and Spanish Merino sheep are more numerous than all others. Good fleeces average from five to eight pounds each, washed. Prices average about 50 cents, although last year (1863) the price was 60 to 75 cents. Wethers are fattened for market. The South Downs and Leicesters are the heaviest. The stock of sheep has been very much improved by the introduction of pure-blood Merinos from Vermont and Western New York.

14. Leicester and Sussex [Suffolk?] swine are the most

profitable. They are slaughtered from 12 to 18 or 20 months old, and average about 250 to 300 pounds.

15. Reapers and mowers, drills and threshing-machines are the principal labor-saving implements, and make a saving of one-half the manual labor.

16. The "Buckeye," "Cayuga Chief," and "Wood's" reapers and mowers are used. Hubbard's mower is preferred by many, as it works well and requires but little repairs. There are other reapers used, but those named seem to have the preference.

17. Hand corn-planters are used to good purpose and considerable saving of labor. Grain-drills are used with a profit. It is calculated that they will pay for themselves every year. I am not able to name the different kinds. Broadcast sowers are not used.

18. The horse-rakes used here are made in this vicinity, and are a great saving of hand-labor. I cannot say what pattern is used.

19. Horse-pitchforks have not been used enough to enable me to state anything definitely regarding them.

20. Hay-tedders are not used.

21. No pains is taken to save the liquid excrements of domestic animals.

22. Stable or barn-yard manure is usually applied to corn and potatoes, and to most other crops. Sometimes it is plowed in for oats and wheat, with great effect. At least 25 per cent. increase of the crop may be expected in ordinary seasons, and if farmers would pay more attention to the making and saving of manures, the products of the county would be materially increased.

23. In addition to the ordinary manures, plaster is the principal kind, and it is used with good effect on grass and corn. It is sown on wheat when the land is seeded to clover. I am not aware of its being used on other crops. Ashes are used, mixed with plaster, with good effect. Plaster costs about $12 to $15 per ton.

24. The value of forest-land has increased as the timber is wanted for staves and for fuel; and wood-land has increased in value within four years 50 per cent. Wood, in our village, has advanced from $1 50 to $2 50 per cord for four-foot wood. Pine lumber has advanced from $8, $10 and $14, to $12, $16 and $20 for the three qualities of common, second-rate and clear.

25. In clearing land, now, the timber is cut into rails, staves, hoopstuff, building-timber and fire-wood. Rails are worth $5 per M; building-timber 10 to 12½ cents per foot, running measure.

26. Farm wages are now $20 per month, and $1 50 to $1 75 per day during haying and harvesting; during the winter, about $12 per month, or 75 cents to $1 per day. In former years, $10 to $12 during the season, and $1 in haying and harvesting.

27. There has not been much done in under-draining.

28. As to the means of advancing the agricultural interest, I would suggest more thorough and scientific knowledge of the different kinds of soils, and their adaptation to the different crops required; a more regular system of rotation of crops; the saving and increasing the quantity and improving the quality of manures; a more general diffusion of the science of agriculture by means of agricultural papers and books, and the formation of farmers' clubs for the interchange of views on all that relates to the farm.

FROM MONROE COUNTY.

BY A. J. KEENEY, OF ERIE.

1. The soil of a small portion of this section was cultivated by the French settlers, before the war of 1812; being open prairie along the lake, interspersed with patches of hazel bushes, &c. Other portions were heavily timbered with white and black-oak, hickory, elm and black-walnut. The surface is

flat, and the soil of both prairie and wood-land is clay loam. Further inland it is varied, being timbered-land and openings, interspersed with small prairies. The soil of the openings is sandy, and somewhat broken by small ponds, which become dry during the summer, and are covered with beds of muck, from three to six feet deep, which will eventually be valuable for manure.

2. Wheat, oats, barley and corn have been the principal crops. More recently hay has become a very important crop, both for market and home consumption.

The average yield of wheat in this vicinity is about thirteen bushels per acre; sometimes going above and sometimes falling short of that mark. There is some falling off in the yield recently, owing in part to the increased severity of our winters, as the country has become cleared, and partly to attacks of the midge and Hessian fly; both of which were for a long time unknown. Again, as the land becomes worn by constant cropping, and in too many instances by improvident husbandry, it fails to respond to the call of the farmer with that certainty it did when first broken up. This is so, to a limited extent, with all crops, but more particularly with wheat. This state of things does not follow as a matter of course. A proper system of rotation, and judicious culture generally, are found not only remedies but preventives.

The variety of wheat which has been the most popular for the last twenty years is the Mediterranean. Standing the winter and the attacks of the various insects, and being better adapted to low, wet lands, it has been cultivated almost universally. There is, however, a new variety, introduced within a few years, which bids fair to rival the former for hardiness. It is called, variously, the Golden Straw, Golden Chaff, and by some the Amber. It is much like the Mediterranean.

3. Wheat has usually sold at $1 per bushel; barley, $1; oats, 25 cents; corn, in the ear, 25 cents; hay, in Toledo, our principal market, $12 per ton. This season it has been $30; and baled hay brings $1 75 per 100 lbs. at this time. Three-fourths

of all the grain raised, except corn, is sold, and one-fourth of the hay. Wheat costs about 56 cents per bushel. Hay, now that machines are used in mowing, costs, to house it, about 75 cents per ton; to do the work by hand, it costs $2. This is exclusive of the use of land, which may be put down at $2 50 per acre. Grain unsold is used to fatten beef, pork, &c., and for feed during the winter to stock, and for bread.

4. Apple and pear trees were set here by the French settlers previous to the war of 1812, and are remarkable for the fine quality of *natural* fruit and for the longevity of the trees.

Pears, and the improved varieties of apples, peaches, cherries, &c., have been introduced more recently, and very successfully. The most profitable fruits are the apple and strawberry. Average price of apples, 40 cents per bushel, sold in Toledo and for shipment to Chicago and the various points west. Apples are more profitable than grain by one-third to one-half.

5. Roots are not cultivated to much extent; are found profitable by those few who have tried them.

6. Sheep are the most profitable stock, though farmers find it to their advantage to mix their products to a certain extent. There is more profit in buying cattle to feed than in raising them.

7. The usual price of beef, on foot, $3 per hundred; pork, $5; sheep, $2 50 per head—more recently from $4 to $6; butter, 13 cents per pound; cheese, 12 cents.

8. Mutton can be produced at least cost; next, beef.

9. The average yield of butter per cow, is 200 pounds. What that of cheese is, I cannot say; there is but little made.

10. I cannot say what is the relative cost per pound of butter and cheese.

11. A diversity of opinion prevails as to the relative profits of breeds of cattle. Some prefer the Devon and its cross with the so-called native stock; others the Durham. I prefer the Devons and their crosses. They come early to maturity, are easily fattened, and are favorites with the butchers. They

make fine, hardy, working cattle. There are but few working cattle used in comparison with horses. The introduction of the Devons and Durhams from New York and Ohio, has improved the stock of the county in a marked degree.

12. The Canadian pony is still used, and by many persons preferred for all work; are well adapted to the road, for light vehicles, and for the *skinning* system of farming practiced by many. A cross of the Messenger and Duroc with pony mares, produces a very fine animal, of great endurance, fair speed and size. Recently, the Black Hawk horses have been introduced, and have met with great favor. When crossed with the cross of the pony and the larger stock, they produce horses about fifteen hands high, and very hardy, and easily kept. This size, for all work, is generally preferred.

13. Various breeds of sheep are kept. The Leicesters and South-Downs, or their grades, and the Spanish Merinos and their grades, are most common. Average weight of fleece, four pounds, washed. Price, 85 cents per pound. Sheep are fattened to some extent. The grade Leicesters and South-Downs are preferred. These breeds have been introduced from Canada and New York, with very favorable results.

14. Suffolk swine and their grades are preferred. They are slaughtered at about six to ten months old, and weigh about 250 pounds.

15. Mowers and reapers, horse-rakes and horse-pitchforks are used. Proportion of manual labor saved, five-sixths.

16. Various kinds of reaping and mowing mowing machines have been tried here, and nearly all have their adherents. The "Buckeye," as a mower, is not excelled; as a reaper, it is not liked. But for all kinds of ground, and as a combined machine, there is none that I have seen equal to the "Cayuga Chief." It mows beautifully, is easily managed, of light draft, and fits itself nicely to the unevenness of the ground. As a reaper, it is light on the horses, and the grain is got off more easily, and in better condition to bind, than from any other machine I have seen.

17. Corn-planters are used to some extent, but hand-planting is preferred by most farmers. What we want is a machine that will plant the corn in the hill, and at the same time drop plaster with it. The grain-drill is used, and with marked advantage. The Star drill is preferred, though others are good machines.

18. The revolving rake is in almost universal use, and is indispensible. It will do the work of ten men.

19. Horse-pitchforks are used, and are indispensable. In connection with the other implements named, they will do the work of from eight to ten men.

20. Hay-tedders are not in use.

The plows are as various as the whims of the farmers in respect to them. The steel plow has worked quite a revolution in plows among farmers having clay land, for which they are a great improvement. For other lands, I prefer the "Eagle" to any other, being light, of easy draft, and very lasting. Others prefer the iron-beam, but they are too heavy for me.

21. No effort is made to save liquid manures, any further than what is absorbed by the straw used for bedding. Farmers, with a few exceptions, are improvident of their manures.

22. Manure is applied to wheat, corn and potatoes. The increase of crop from twenty loads per acre varies, but may be safely put down at one-third. Much of the strength of yard manure is lost by the drain and wash from the yards.

23. Plaster is used on our sandy land with very favorable results. It usually costs $6 per ton; the cost now is $8 per ton at Monroe.

24. Forest and wood-land has advanced in value 50 per cent. within five years. Wood and lumber have doubled in the same time.

25. In clearing land, the timber is disposed of in the form of cord-wood, lumber and railroad-ties. Cord-wood is worth from $2 to $4 per cord, at Monroe and Toledo. Oak lumber at the country mills is worth $12 per M.

26. This season, wages for farm hands range at $18 to $20 per month, and $1 per day and board, during the summer; in winter, about $15 per month, and 75 cents per day. In former times, $13 per month in summer, and $10 in winter, or 50 cents per day.

27. Tile-draining has been done to some extent in the county within a few years. The result is very favorable. I cannot say what the cost is. The tiles cost at the factory from 40 cents to 75 cents per rod.

28. In regard to means of advancing the agricultural interest: Convince the farmer that labor is honorable; *educate* him, enlighten him, refine him. Just in the proportion in which you educate and refine the farmer, you improve the manner of cultivation, you create a spirit of emulation, you teach him when and how to apply power, and what *his* power is. Ignorance is the bane of the farmer; and it is the most difficult thing to convince him of this fact. When convinced, when the prejudice against education is done away, and the farmers are educated, the drudgery of labor is removed, and it becomes a pleasure. They see things in a different light. Next to education, *thorough drainage* is most needed.

FROM MONROE COUNTY.

BY E. WILLARD.

I will endeavor to give you correct answers to the questions proposed in your circular, as far as they relate to the township of Ida, Monroe county, that being my residence.

1. The first settler located here in 1834. Soil mostly heavy clay, wet, originally covered with muck, or decayed vegetable matter, to the depth of from three or four to fifteen inches. On some portions the soil is light, interspersed with sand ridges. It was originally prairie, "opening," and wood-land, in nearly equal proportions. The prevailing species of trees are oak, ash, elm, hickory, a few walnut, maple, basswood, sycamore and cottonwood.

2. The principal crops are wheat, average yield, 10 bushels per acre; corn, 18 bushels; oats, 20 bushels; potatoes, 50 bushels. There has been no increase or decrease in the general yield. A variety of wheat called the Mediterranean—a red-bearded variety—has been mostly cultivated. The seed was originally brought from Maryland. Its quality had much deteriorated, until fresh importations were made two or three years ago. This variety seems to do better than any other in this locality. White wheat is being raised more than formerly, and does very well.

3. General price of wheat from 75 cents to $1 per bushel; oats, 25 to 30 cents; corn, from 30 to 80 cents; potatoes, 20 to 50 cents. Corn has generally been considered the most profitable crop. All crops are sold except the amount necessary for farm stock and family use.

4. Apples, peaches and cherries, are the only fruits generally cultivated. There are but few peach trees now in the township.

5. Roots are but little cultivated.

6. Live stock has been very much neglected. Cattle and sheep are most profitable.

7. Beef generally brings from 1½ to 4 cents per pound, live weight; pork, 4 to 6 cents, dressed; mutton, good wethers, from $1 50 to $2 dollars per head, alive; butter, from 10 to 15 cents per pound; cheese, from 5 to 10 cents.

8 and 9. Cannot answer.

10. No cheese made on the factory system.

11. Cattle are mostly of the common or "native" sorts. The introduction of the Short-horns has very much improved the fattening qualities of our stock. Devons are handsomer cattle than "natives."

12. Our horses are of various sorts. French ponies, Pennsylvania farm horses, and "common" stallions, have produced the most of our stock. A medium sized horse is most profitable for farm work.

13. Leicester and French Merino sheep are the distinct breeds that have been mostly introduced, and these have been crossed with our common or "native" breeds. We have but few pure-blood sheep. The average weight of fleeces is from three to five pounds. Market price, from 25 to 40 cents per pound.

14. A kind of swine, called here the "Grass breed," is most profitable—a short, chubby variety, easily fattened; usually slaughtered at two years old. Average dressed weight from 150 to 200 pounds.

15. Mowers and reapers, and wheat-drills, have been introduced with good success. Corn-planters with poor success. An implement for cleaning out furrows in grain-fields, invented by one of our townsmen, has been introduced upon nearly every farm, and has rendered this portion of labor very light.

16. Ketchum's, Kirby's, Manny's, Ball's, and the Buckeye have been introduced. Each claims the preference. I like the Buckeye best, being as easily drawn as any, does good work, and has but very little side-draft.

17. Corn-planters are very little used—land two poorly cultivated for them. Grain-drills are very commonly used, with much satisfaction. Fertilizers consist generally of home-made manures. Too little attention is paid to manuring. Plaster used a little, but scarcely pays, except on clover and corn, on a few farms.

18. The revolving horse-rake is generally used. It is decidedly the best *cheap* rake in use.

19. Horse-pitchforks are coming into use—universally commended where used.

20. We have no hay-tedders. Plows are very much improved. Rockwell's is best for all uses. All kinds of harrows are used. The best farmers use the square-hinged and butterfly-shaped. The three-shovel plow or cultivator, is most generally used—an excellent implement. The furrow-cleaner I have already described, in answer to question 15. We have an improved road and ditch-scraper, for which an application for a patent is now

pending. It will do the work of a common scraper at about 50 per cent. less cost.

21. A common, wasteful practice is pursued with manures.

22. Manure is applied to all crops, with excellent results; new prairie soil very much benefitted.

23. No special manures have ever been tried, except plaster.

24. The value of wood-land has increased at least one-third in the last five years, and the price of wood and lumber has nearly doubled.

25. In clearing, oak timber that will do, is made into rails. Saw-logs of all kinds are generally saved. The balance of the growth is burnt on the ground, except that used for firewood.

26. From sixteen to twenty dollars per month is paid for labor during crop-producing and harvesting season. Formerly from twelve to fifteen dollars in summer, and in winter from eight to twelve dollars per month.

27. Experiments have not been made in under-draining to much extent. Where tried at all, it has paid well on all soils. All of our soil has a hard substratum.

28. Ditching is the first and most important improvement required. Anything that will stimulate intelligent farming, will not, of course, be amiss. Agricultural societies should be encouraged, and the dissemination of a knowledge of correct agricultural principles and practice; and especially a knowledge of the agriculture of this State, should be carried into every family.

I am very much pleased with the course you have taken to ascertain the agricultural condition and prospects of this State. The proposition to open communication with farmers indicates sincerity in an effort to prepare *useful* reports. The greatest misfortune to the farmers of this State, and we might say this country, is their almost entire silence, and extreme *mind-your-own-business* way of living. The owner of 40, 80, or 160 acres of land, applies his personal attention and personal labor to its cultivation, year in and year out, with no guide but his own and his neighbors' experience. The cultivation of his mind, or the application to his business of anything like *science*, seems strange to his mind. Public interests are undefined mysteries to him. He sometimes talks of the nobleness of his occupation and its usefulness, and dwells with heavy emphasis upon his importance in propelling the machinery of society and government; but, as an *effective* man, he is only a laborer and producer of articles for the consumption of his fellow men. This is the class of men that it is your object to benefit, and you ask persons in different localities of the State to make suggestions for you. My suggestion is that you, by some means, create an interest in the minds of these men in reference to the general agriculture of the State, and cause them to look about for opportunities to improve their social condition, and cause a better understanding of the relation between agriculture and the other pursuits of life. Teach farmers their importance, and the means by which they can exercise the influence which naturally belongs to them.

FROM OTTAWA COUNTY.

BY M. D. HOWARD, OF HOLLAND.

1. This township was an unbroken wilderness in 1846. At that date the Rev. A. C. Van Raalte, a clergyman of the Protestant Dutch Reformed Church, immigrated to this locality from the Netherlands, bringing with him a few hundred of his countrymen, who for several years subsequent to that period continued to arrive in more or less numbers, and have populated the township of Zeeland, adjoining us on the east, Olive, on the north, and the two extreme northwest townships of Allegan county, directly south and southeast of us. This township proper approaches Lake Michigan on the west to within five miles, (a fractional township being situated on the west of this,) and the township of Olive (north of us,) and attached to these townships for judicial purposes.

The shore of Lake Michigan, consisting of a territory of six to six and a half miles in breadth, consists of a light, sandy soil. The rest of the township, including the township east of this, is a fine clay loam, susceptible of the highest production. All the timbered land on the sandy belt consists of pine, hemlock, beech and soft maple. The hard maple, buttonwood, beech and hemlock comprise the species on the clay and loam belt. There is no prairie, or openings, in this or the adjoining townships. In this township there are but small tracts of wet or swamp lands, and these are considered the most desirable for the cultivation of the *grasses*.

2. The principal crops are wheat, maize, rye and potatoes, upon the sandy belt, and the same, with the addition of oats, barley and rape-seed, have been cultivated to a small extent upon the clay and loam belt. The yield per acre of wheat ranged from 12 to 50 bushels per acre. The season influences the products to a large extent in all countries, and its usual influence is felt here. Farmers who own both sand and clay soils, remark that they are more sure of a good and regular yield of wheat upon the sandy soil than upon the clay. My observations confirm their statements. The sandy soil produces excellent potatoes, comparatively free from rot. The white winter wheat is the kind preferred, and its production is on the increase.

3. Wheat has borne better prices generally, compared with the rest of the county, as we are accessible to Chicago by water, and are governed by its market value there, except in seasons when there is a partial failure of the crop. We have had two partial failures since 1854. Hay has sold at an average of $10 per ton for the last ten years, at this place (the village of Holland.) The hay crop is esteemed the most profitable; yet wheat pays well, as do potatoes, and in fact, all other products of the soil. The dairy is well managed, and is profitable. Probably no township in the State produces half the eggs that either this and the adjoining townships produce. The abundance of this product is a characteristic of the Hollander. What the peculiar management of the fowls is, I am unable to say. In some instances, I am informed they remain in the houses with the family.

The Hollanders are fine stock-raisers, and of late years are over-crowding their farms with horses and cattle. Few sheep are kept as yet, but they are being introduced. In fact, it is but a few years since wolves and dogs rendered the keeping of sheep here out of the question.

4. The sand-belt of Lake Michigan, as is pretty generally known, is destined to be one of the finest fruit growing regions in this or any other State, more particularly for the peach, plum, pear, apricot, and crab-apple. Grapes flourish exceedingly. Our climate renders the production of the fruits enumerated quite certain. There were exported to the Chicago and Milwaukee, and other markets, in the year 1863, 5,000 bushels of peaches. Other fruits are not as yet much exported. Within the last two years, it is safe to say, 30,000 grafted peach and other fruit trees have been planted. They are all doing well, but the last winter was very severe upon peaches. I lost, perhaps, 100 of my orchard of 600. Last year the crop of apples was short, and the best varieties readily secured $1 per bushel. Common peaches sold at 25 to 50 cents per bushel; grafted, at 75 cents to $2 per bushel.

5. Root crops are comparatively little cultivated in this and adjoining townships, except potatoes, which are extensively cultivated, and are largely in use among the Hollanders. They are raised in large quantities, and of fine quality. The common "Black" and the Neshannock thrive well upon the sandy, light soil in the west, and the Peach-blow, Black Neshannock and other varieties, on the clay and loam. No portion of the State is better adapted than this for the cultivation of roots, and in my opinion its expediency will soon be realized. People soon find their true interests, and perhaps none so soon as that class who successfully cultivate the soil. They have ample time for reflection, and when the light is once let in it is sure to radiate.

6. Swine, cows, horses, working and other cattle are all kept, to some extent, and are deemed profitable; perhaps the most so are cows for the dairy.

7. Until this season, beef has usually sold at the butchers' stalls at 5 to 6 cents per pound; pork at 5 to 7 cents; mutton at 10 cents; butter 6 to 16 cents. There is no cheese made in the Colony. All of the above products of the farm are largely sold in this market, and all taken to Grand Rapids and Grand Haven, thirty and twenty-two miles distant from this place, respectively.

8. Beef can be produced at less cost than either of the other kinds of meat. The river bottoms afford ample grazing, and the clovers and grasses abound on the clay and loam lands to the east of us, and south in the townships adjoining us in Allegan county.

9. The average annual yield of butter, per cow, in Zeeland is 140 lbs. In Overysel it is considered 180 lbs. In this township, where the grasses are less abundant and nutritious, the average would not exceed 110 lbs. per year. Cheese is not manufactured at all except for home use.

10. Butter sells at a profit at 10 cents per lb., when hay is not over $8 per ton on the farm.

11. Stock-raising has not been *scientifically* followed by the Hollanders, as yet, but they are improving fast. Most of the stock is "mongrel." Still the Short-Horn is often seen, as well as the Devon. But most of the stock is crossed indiscriminately with "native," and as there is little attention paid to the subject it is impossible to define the "breed." Probably we have *more kinds* than are often found in so contracted a locality. But I may add that, for common stock, the cattle compare well with other portions of the State. The Hollander well secures his cattle before he does himself; as between them and the family, the former take the invariable preference. In an early day it was not an unusual occurrence to see the stock and family domiciled together, under the same roof—often in the same apartment; there being but one in the house, this was unavoidable. This speaks something for their humanity, rather at the expense of their sanitary interests. Horses and

oxen are extensively used in the cultivation of the soil, and for other purposes.

12. The breeding of horses is being prosecuted with commendable diligence, but upon about the same plan and theory that cattle are bred. We have the required number of breeding stock, but they have no pedigree that is at all reliable.

13. But few sheep are yet kept. Probably there are not 1,000 in the four townships to which I have alluded to.

14. Swine are profitable, as the lumber interest makes a constant demand for all the pork that is produced. Hogs are generally slaughtered at eighteen to twenty months old. There is too much of the "native" in the swine as well as the cattle, and the same remarks will apply to them in regard to the treatment. I don't know whether the pig or the cow takes the preference in the affections of the people. They are well treated.

15. The various labor-saving machines are in general use, except upon lands too recently cleared. The threshing machine, wheat-drill, horse-rake, cultivator, subsoil-plow, and in fact nearly all the improved farming utensils are in general use. In this respect the Hollander is a very different person from the common class of Europeans who emigrate to this country. He is always ready to adopt anything new that has a reasonable prospect of advantage, and when he purchases an article, of whatever kind, he invariably takes the *best*. I think one-fourth of the labor is saved by using the various improved machines.

16. There are no reaping machines in use, as we have too many stumps. The same as to mowing machines.

17. Corn-planters are used in many instances, where the stumps are sufficiently removed to admit of them; also, grain-drills. Broadcast sowing machines I have not yet seen in this Colony.

18. I do not know what kind of horse-rake is most esteemed.

19. Horse-pitchforks are not used.

20. Hay-tedders are not in use in our vicinity.

21. All manures are extensively used in this and adjoining townships, and sell readily at $1 per load, delivered.

22. The stable manure is applied to all kinds of crops, and has been found to double the yield, particularly on the sandy land.

23. Plaster is extensively used; so are ashes, when they can be procured. My experience is, that 20 per cent. is the gain in the yield of crops from the application of these articles.

24. The products of the forest have doubled in value within the last five years.

25. When the timber is of value for lumber, it is manufactured as such; otherwise, burned or made into firewood, if markets are accessible. Lumber—pine sells at this place at $12 per thousand for common; hemlock, $8; oak, $15; buttonwood, $10; soft and hard maple, $12; cherry, in small quantities, at $20.

26. Farmers pay laborers this season $20 to $26 per month, and board. Last winter the price was $10 to $16, and board. In harvest, the price this season will be $2 50 per day, and board. Usually, heretofore, the price has been $1 50 to $2.

27. No experiments have yet been made in draining.

28. To my mind, the first great requisite to the successful cultivation of the soil in this vicinity, is more particular attention to the breeding of stock. Much is lost by this neglect, and I consider it of the first importance.

What we next need most, and perhaps it should be considered the first, is an agricultural journal in the Holland language, as not one in ten can read English. I think 300 or 400 copies, and perhaps more, could be sold in this community, and in other portions of this State, Iowa, Wisconsin, Illinois, and other States, 10,000 could be circulated. The writings of Liebeg have added to the agricultural wealth of the world millions yearly, since they have been put in popular form, and all of this is as yet a "sealed book" to the Hollander, who can read only his native tongue.

FROM ST. JOSEPH COUNTY.

BY CHAS. BETTS, OF BURR OAK.

1. This county has been settled over thirty years. The soil is *drift*—chiefly of that specific quality known here as "burr-oak soil"—a dark, and quite heavy, gravelly loam. It is dry, and in but few instances needs under-draining, nor would it be benefited by sub-soil plowing, as my experience has satisfied me. There are two small prairies in the county—Sturgis and Nottawassippi—but they both partake of the gravelly character of the burr-oak plains which surround them. The timber consists of two or three varieties of oak, and of a variety of white-walnut or hickory.

2. The chief crops are wheat, corn and peppermint. I am unable, at this moment, to give you the average yield per acre "from the first," but I am sure it has not decreased. I think I may safely say there has been an increase of the average yield of wheat, owing to better culture, manuring more generally, and the turning under of clover. As to the comparative yield of red and white wheat, taking a series of years together, there is little difference—the one and the other alternately taking the lead, as the season is favorable or unfavorable—the red invariably turning out better with inferior culture and a bad season, and the white and amber predominating under good treatment and a good season.

The average yield of the corn crop I am also unable to give, but it is fair, and I may say high.

I cannot give you the amount of peppermint-oil now exported from this county. It, however, equals the entire production of the whole country besides, and probably more.

3. Wheat is the only cultivated crop that is generally marketed in the raw state. A very small proportion of the crop is manufactured into flour, but the grain is sent out of the county —draining our soils of the rich phosphates, and transferring them to soils of the East, to our ultimate great disadvantage if not permanent injury.

The Indian corn crop is the great staple feed for work-horses and cattle, and for making pork—very little being now marketed raw.

4. Apples, pears and peaches are the principal fruits. The small fruits are very little cultivated. Our soil is well adapted to grape-culture, but the uncertainty of the old sorts to ripen has prevented, heretofore, the general culture of this wholesome fruit. It is believed that with the newer sorts we shall be more successful, and shall plant more freely. Apples usually bring half a dollar a bushel, delivered at railroad, and go to western markets.

5. Root crops are not cultivated to much extent.

6. Beyond the stock deemed essential to farm management, probably swine have turned the quickest and brought in the greatest amount of clean cash for the expense. Sheep are here among the most profitable of all farm stock.

7. Beef has brought $4 to $5 per cwt.; pork $5 to $7; mutton, no sale; butter 10 to 20 cents per lb., now 40 cents; cheese 12 to 18 cents.

8 and 9. I have no data for answers to these questions.

10. Cheese is not made here on the "factory system." Very little is made in this portion of the State.

11. No special attention is paid to raising cattle for beef. The common stock of the country is kept for the dairy. As to oxen, they are few and far between. Those with a show of Devon blood are most sought after. Both the Devon and Durham breeds have been introduced into this county, but not with very flattering success. The soil being far better adapted to the production of grain and wool, these take precedence of all other products.

12. We have no distinct breeds of horses. Those of the weight of eleven and twelve hundred pounds are the best adapted for all-work. The horse of all-work is the horse for us now. We look for style and strength in the same animal.

13. We have Spanish Merino and grades of this variety of sheep. Before the present year wool has sold at an average of

about 65 cents per pound. "Mutton sheep" are not raised here.

14. So far as my own experience goes, the Essex hog is most profitable. Grades of the Chester White are now being introduced—I do not know with what results. Hogs are usually slaughtered at about a year old.

15. The common labor-saving implements and machines are generally used, but to what extent they have displaced manual labor, I cannot tell, precisely.

16. A great variety of reaping-machines are in use. The "Ball" and the "Kirby,". I think, have heretofore taken the lead. Opinions as to their merits, respectively, vary so much that no positive statement can be made as to the general or special superiority of one machine over another.

17. Wheat-drills are used extensively, of several different makers. Machines which sow ashes or plaster are not in use here.

18. The old revolving horse-rake is the only one in general use.

19. Horse-pitchforks are not used, to my knowledge.

30. Hay-tedders are not used at all.

21. No pains are taken to save the liquid excrements of animals, and the solid are rarely sheltered.

22. Manures are applied to corn and wheat. The yield is increased from one-third to one-half.

23. Plaster is freely used on red clover, at the rate of 50 to 100 pounds per acre. The other articles mentioned are not used. Plaster has cost, at the warehouse, $7 to $9 per ton. It has a favorable effect on clover, doubling the yield, but on other crops its effect is not very perceptible.

24. Wood-land has doubled in value during the last five years, within five miles of a railroad; so, also, has wood and timber, or nearly so.

25. All the timber is made into either rails, firewood or lumber. Wood is worth $2 50 per cord, delivered; lumber, $18 per thousand, at the mill.

26. Laborers get $1 25 to $2 per day, and $15 to $20 a month, during the summer months.

27. No underdraining is required in this county, except in a very few cases, where springs are cut off, and the water carried a short distance.

28. Of improvements most needed, I would mention,

1. *Better care of manure.* The proper care of manure is the starting-post in all good farming, and this is the most important improvement needed here.

2. *Improved breeds of horses.* This is an improvement much needed in this county. Our horses are of mixed breeds, and we have no standard or reliable breeds.

The devoting of so large a space of the best portion of this county to peppermint culture—which has been a mine of wealth to those engaged in the business—has tended to retard improvements in stock-raising, and in other departments.

I cannot say that the use of other artificial inorganic manures than those above spoken of, would prove profitable at their present prices, and in the present condition of our lands. Farmers find so ready a means of increasing their great staple, wheat, by turning under clover—though at the expense of the subsoil, no doubt—that they cannot be made to believe that artificial manures will pay, except plaster, and that is very cheap. One farmer I know, and who is on rather a light soil, has constantly increased his returns by following this rotation: 1, wheat, seeding with clover; 2, pasture; 3, meadow; 4, manure turned under for corn; then summer-fallow and sow to wheat again. He keeps all the sheep and other stock he can, and he is gradually but surely getting rich.

REMARKS ON THE FOREGOING RETURNS.

From the indefiniteness of many of the statements respecting the yield of crops, it is impossible to deduce a general average for the State, or for the counties from which returns have been received. But there are certain points comprised in the communications which deserve notice, as follows:

Wheat.—In various instances, the yield of wheat is said to be less, latterly, than it was when the soil was first cultivated. In other instances, as in Berrien, Lapeer and Ottawa counties, it is stated that there has been no decrease in yield, but, in some cases, an increase, which is attributed to a more general practice of good cultivation. Probably, however, there has been in most cases a decrease, the cause of which it is important to understand.

It seems reasonable to suppose that there has been, in some cases, actual deterioration of the soil from neglect to supply the elements taken up by crops; but from the evidence obtained, it does not appear that this is the principal cause of the decline in the yield of wheat. The returns show that here, as in other sections of the country, the deficiency in the yield of wheat of late years, is due more to the ravages of certain insects than to any other cause. The principal insects alluded to are the Hessian fly—*Cecidomyia destructor*—and the wheat midge—*C. tritici.* Both species were introduced from Europe. The name of Hessian fly, applied to the former, was given on its first appearance in this country. In the time of our war for independence, the British government employed troops from Hesse Cassel—*Hessians.* When these troops were landed on Long Island, N. Y., some straw which had been used on board the transport ships, was taken to the encampment. Immediately after this, the wheat fields in that neighborhood were attacked by an insect which had never before been seen by the inhabitants, and conjecturing, rightly, no doubt, that it proceeded from the straw before mentioned, they called it the *Hessian fly*.

This insect has since devastated the wheat-fields of this country. Its progress into the new settlements has, however, been comparatively slow. In the Western States several crops were generally obtained before the fly became sufficiently numerous to do much damage, but it gradually increased, till in most sections the crops have been more or less injured. The prevalence of the insect, however, and the damage inflicted by it, varies considerably in different sections, even in districts where it has been long established. The causes of this variation are somewhat obscure, though they are known to be connected with the attacks on the fly by a parasite, which sometimes destroys immense numbers.

The wheat-midge made its first appearance in North America about the year 1830. Lower Canada was the scene of its first depredations. From this point it soon spread into the other British Provinces and the New England States, and has been gradually extending itself westward, till at the present time it has probably almost reached the limit of wheat cultivation in this direction.

The wheat crops of Michigan, as well as those of Northern Ohio, Western New-York, and Upper Canada, seem to have suffered more from this insect, of late years, than from the Hessian fly. It is not unlikely that the names of the two species have been confounded, in some cases, though their habits are very different. The attacks of the Hessian fly are confined wholly to the straw, and those of the midge to the grain or to the head. It may be well to remark, in passing, that the midge is sometimes called "the weevil," a name which belongs properly to a small beetle which eats stored grain only, being never found in the fields.

Allusion is frequently made in the returns to the substitution of red wheat for white, on account of the greater uncertainty in the yield of the latter. This change, which in some sections seems to have been very general, has given rise to much speculation; but the result of pretty extensive inquiry and observation is, that so far as a necessity for the change exists, it rests on the fact that the varieties of white wheat heretofore cultivated, usually suffer more from the midge than the red varieties which have taken their places. There are various reasons for this. The former were mostly bald or beardless, which the midge seems to prefer to bearded kinds. A more important reason is, that the red varieties introduced escape the midge on account of their comparative earliness. It is this quality, probably, more than any other which has caused so extensive an adoption of the Mediterranean wheat. When first introduced it was ten or twelve days earlier than the common white kinds, and was almost totally exempt from the midge. Some statements indicate that the difference in the time of ripening is not now as much in favor of the Mediterranean as formerly. If this is true, the variety has probably been changed by admixture, or by neglect to save seed from crops which preserved the original qualities.

The fact is well established that early *winter* wheat is less liable to injury by the midge than late. The explanation is, that it gets so far advanced by the time the insect appears as to be passed by. The period in which wheat is subject to the attack of the midge extends through a few days only. Hence the importance of hastening it through this period is obvious, and should be kept in view in cultivation. A good preparation of the soil and timely sowing, may often be the means of saving a crop from the midge by gaining a few daws in maturity. Mr. Johnston, of New York, whose large average yield of wheat for many years has been a subject of frequent remark, attributes his success in a great degree to the earliness of his crops, induced by good cultivation. It is worthy of mention, that he has always raised white wheat.

It may be well to state, in this connection, that the advantage of earliness in winter wheat does not apply to *spring* varieties. It was found, soon after the appearance of the midge in this country, that the common kinds of spring wheat, sown at the usual time, reached the stage most favorable to the attack of the midge just at the time the midge was ready for them. Later sowing was therefore resorted to, in order that when the insect appeared the wheat should not be far enough advanced to be attacked. This course succeeded to some extent—crops sown the latter part of May and the first of June often yielding well. But as an offset to the advantages obtained from late sowing in avoiding the midge, it was found that late crops were more subject to blight or rust; so that in some cases it became a perplexing question which of the enemies to the crop it was most expedient to endeavor to avoid.

The difference in the market value of red and white wheat is so greatly in favor of the latter as to add much to the inducements for its cultivation. We need not stop here to discuss the question whether this difference is wholly based on the intrinsic or nutritious properties of red and white wheat. Probably it is not; and hence, so far as the farmer raises wheat for his own family, a given weight of red wheat may be as valuable as white; but when he comes into the market he must conform to prevailing rules as to price, whether the rules are reasonable or not.

It will be noticed that many of the returns state that when red and white wheat both do well, the white generally yields best. Under favorable circumstances, therefore, there is a double advantage in the white—it give the largest yield, and brings the highest price per bushel. The means by which so important an advantage can be secured, are, of course, worthy of consideration. How, then, can the farmer render the crop of white wheat most certain and profitable? From what has already been said, it will appear that the most essential point is *earliness.* This desirable result depends chiefly on two things—the habit of the variety, and the observance of proper rules in cultivation.

There are early varieties of white wheat, some of which have been tried in this State with so favorable results as to commend them to the attention of our farmers generally. A kind called the early Boughton, sent out from the Department of Agriculture at Washington, has been successfully cultivated in some instances. It was grown the past season on the farm of S. S. Bailey, of Grand Rapids. He states that the yield was thirty-three bushels per acre, while the Soule's wheat, on adjoining land, with similar advantages, except that it was sown several days earlier, yielded twenty-five bushels per acre. The early Boughton, as grown by Mr. Bailey, is a light-colored, plump, rather flinty and heavy grain.

Another variety sent out by the Department of Agriculture, is the Tappahannock. Samples were sown last autumn on the farm attached to the Agricultural College. The grain resembles that called the early Boughton. Whatever differences there are in the varieties, (should they prove to be distinct,) will appear from their growth.

The statements in the returns as to the comparative advantages of drill and broadcast sowing for wheat, deserve notice. As further illustrating this point, attention is invited to an article appended to this report, from the bi-monthly report of the Agricultural Department at Washington.

Fruits.—The returns show that apples are considered a very profitable crop. There is no doubt that they are, and will continue to be so, where proper attention is paid to the trees. Heretofore apple trees have usually been productive in Michigan, with but little care or cultivation. The pear and apple trees planted a century ago or more, by the French settlers of Detroit and other places, still live. The large size and vigorous habit of the former have attracted the attention of many people. There is no question that the soil and climate of Michigan are particularly adapted to the production of the apple and pear. Peaches also do well over a considerable portion of the State. The protection which the forest affords has unquestionably an important influence in reference to the production of these fruits. The position of the State in respect to access to markets, is also a point of much importance. Fruits may be sent either to our eastern or western markets, according as prices may warrant. The Prairie States will not produce apples, pears and peaches as readily as they are produced in this State, until the extensive planting of timber shall afford the required protection. Hence the demands of Chicago, Milwaukee and other cities of the West, must for years be met with supplies from this State. This point deserves particular notice, and should lead to increased attention to the cultivation of the fruits mentioned. Some of the southwestern and western counties have taken up the cultivation of peaches extensively.

Root Crops.—These appear to be but little cultivated in the State. Some of the returns indicate that more attention to them would be advantageous to the farmer. The principal obstacle to this branch of farming is the amount of hand-labor required, or supposed to be required, in the cultivation of roots. It must be admitted that this is an argument of some weight, under the present scarcity and high prices of labor. In fact, it is a mooted question, how far our farmers would, at this time, be justified in engaging in this business. The case will be somewhat changed, however, when the condition of the country becomes settled, and labor resumes its natural channels. But it may be here remarked that in regard to the amount of hand-labor required in the cultivation of roots, it is much less where the business is undertaken systematically than in the loose way in which it is too generally practiced in this country. Instead of doing all the work by hand, much of it can be performed to better advantage by horse-power. The seed can be sown and the crop chiefly cultivated by machines or implements drawn by horses. But to render it an object to procure the requisite implements, it is necessary that the cultivation be adopted on a considerable scale.

It has been pretty well demonstrated that a greater amount of sustenance for domestic animals can be obtained from the same amount of land, by the cultivation of roots than by any other crops. It is probable, also, that in some cases a given amount of manual labor will produce more of this sustenance than could be produced in any other way. The general expediency of root-culture in England rests on these points. The same remark will apply to Canada, where root-culture is practised to a much greater extent than here. But to portions of our country which possess unusual facilities for the production of grain—as, for instance, the production of Indian corn on our prairies—the principle seems inapplicable, so far as relates to the proportion of animal sustenance to manual labor. It may be said, however, that the conditions of a large portion of Michigan, as to the character of the soil and climate, and the facilities for cultivation, approximate more to those of Canada West than to the prairie region which is so favorable to the production of Indian corn. On the whole, it appears that further experiments in root-culture in this State are desirable, and that they should be conducted in such a manner as to elicit facts in regard to the general advantages of the system, and, as far as practicable, to show what kinds of roots will afford the best returns for special purposes.

Dairy Produce.—The returns show that this important branch of husbandry receives too little attention in the State. Butter is not made in large quantities, and of cheese, the quantity made falls much short of supplying the population. No good reason can be seen why these articles should be neglected. In regard to butter, the question presents itself whether more attention may not in many cases be advantageously given to the improvement of the quality. The facilities for making good butter here, though not, perhaps, equal to those of parts of Pennsylvania and some other sections, are still equal to many districts where a large quantity of butter of good quality is annually produced. Though the favorite "spring-houses" of Pennsylvania are not generally available here, a very good substitute may be had by so constructing milk-houses or rooms, that cold water from wells may be turned through them, in troughs containing the milk, and by keeping the cream and butter in ice-houses—of which every farmer may have a good one—a fine quality of butter may be produced through the summer.

As to cheese, there are, apparently, no obstacles to the production of the article here to as good advantage as is done in New York or Ohio. It is certainly a singular fact, that with all the facilities which the State of Michigan possesses, she should be constantly dependent on other States for a very large proportion of the cheese which is here consumed. There can be no doubt that the profits of cheese-making, under good management, are highly satisfactory. The adoption of the "factory system," so called, has increased the profits of the business, while it has resulted in the production of an article of more uniform excellence, and has greatly relieved the farmer's family from the burthens which attend the ordinary mode of manufacture. The factory system consists, briefly, in this: the milk of the cows of a neighborhood, sometimes to the number of a thousand or more, is collected daily, at a building provided for the purpose, where it is made into cheese by persons specially employed to attend to the business. The cheese is sold at regular periods, and the proceeds divided among the persons who furnished milk, in proportion to the quantity delivered by each.

In connection with this subject, it may be remarked that when dairying shall come to be regarded by the farmers of Michigan in the light which its importance demands, more attention will naturally be given to the propagation of *true dairy stock*, a matter which seems to have been hitherto neglected.

Sheep-Husbandry.—The returns show that this is an interest of great magnitude. There is no doubt that one of the most valuable products of the State for many years to come will be wool. The supply of cotton is likely to fall short of the former consumption for sometime, and wool must be used to a great extent as a substitute. This will keep up a brisk demand for the article at a remunerative price. Michigan already stands prominently in this great interest. She will probably rise rapidly higher in the relative scale of production, and it is not unlikely that in a few years, the State will contain more sheep in proportion to the population than any other in the Union.

The variety of sheep likely to be most generally profitable here, is the Merino. This breed will produce more wool for the cost of keeping than any other, and, in ordinary cases, it will bring most per pound. The remark in regard to the profitableness of the Merino breed, relates wholly to the production of wool, which is, and probably for some time will be, the leading object in keeping sheep in this State. Near large markets, the demand for mutton will be such, that those breeds from which it can be produced at least expense, or which, in reference to the production of flesh and wool combined will afford most profit, should be adopted. In such cases, some of the English breeds—as the Cotswold, Leicester, and the different varieties of Downs, so called—would be more profitable than the Merino. It is worthy of remark, however, that the immense consumption of beef by our armies must necessarily cause that article to be scarce and dear for several years, and that hence the amount of other meats consumed, especially mutton, will be greater than formerly. This, of course, will increase the inducements to keep the English breeds of sheep, and within a certain distance of large markets, their number will be multiplied.

It should be noticed that in regard to the question as to the comparative cheapness of producing beef, pork and mutton, most of the returns are in favor of the latter. It should be observed, too, that so far as a comparison is made in reference to the profits of different breeds for fattening, the English breeds are preferred to the Merino.

It may not be amiss to state here, that to derive the greatest profit from sheep, either in wool or flesh, close attention to their condition is required at all times. To produce the most valuable staple of wool, there should be an equal and uniform growth from one shearing to another, and to this end, regularity in the supply of food, and proper shelter from the inclemencies of the weather, are of essential importance. Is there not too much negligence in reference to this point among the farmers of this State? Is it not a fact that many sheep may be seen in the spring of the year with bodies naked in some places, and in others covered with patches of dead, matted wool, of little value to the manufacturer? In other cases, where the wool does not actually fall off, it is greatly deteriorated in weight and value by its unequal growth. All this might be avoided, and the profit of the farmer increased, by due attention to the regular supply of food, and proper shelter. Next in importance to the regular supply of food and shelter, is breeding only from the best animals. The fact is established, that by attention to this point, the actual profits of sheep, both in regard to fleece and carcass, may be greatly increased.

Breeds of Cattle.—The only distinct breeds of cattle mentioned in the returns as having been introduced into the State are Short-horns and Devons. So far as direct statements are made, both these breeds are considered better for beef than the common, sometimes (but improperly) called "native" stock. In regard to milk, the Short-horn is not placed so high, a preference being generally expressed for a cross of the Devon or of the common stock. The Devon *grades* are in several instances spoken of as good milkers. In some instances the introduction of the Short-horns is spoken of as not being attended with successful results. These reports seem to come generally from districts where grass is not abundant, and where the keeping allowed to cattle is not high. To such situations, and especially in connection with exposure under a rigorous climate, the Short-horns are not adapted. Their proper sphere is where they can have abundance of good food, without being subjected to great severity of weather. In such situations they are, when judiciously chosen or bred, a very valuable stock, particularly for beef, the making of which, at an early age, is the purpose for which they are chiefly prized.

The Devons, or Devon crosses, are invariably spoken of as being superior for labor, and, as oxen are used in farm work to considerable extent throughout a large portion of the State, the introduction of this breed seems to be attended with considerable advantage. Judgment, however, is required in the selection of breeding animals. The tendency of the breed is to too small size for oxen of sufficient power for the heaviest work. It is seldom that the full-bloods are large enough for this. By selecting well-grown and well-shaped bulls, however, there is no difficulty in obtaining, from common cows, oxen which are large enough for any purpose. By selecting large and handsome half-blood heifers and breeding them to a full-blood Devon bull of the proper character, three-quarter bloods will be produced, the males of which will possess the requisite size, with more symmetry and better fattening tendencies than the half-bloods, while they have equal strength and greater activity.

It is somewhat singular that only the two breeds mentioned should have been introduced into the State, or at least that they are the only ones which, previous to this year, were established here. It is hardly necessary to say that there are other breeds which eminently deserve a trial by our farmers. Among these may be mentioned the Hereford, Galloway, and Ayrshire.

The characteristics of the Herefords are similar to those of the Devons, though they are much larger, ranking next to the Short-horns in size, and falling but little below them in weight of carcass, when fattened at mature age. They were formerly used extensively, and are still used in some districts in England, for the yoke, for which they are highly esteemed, uniting the activity of the Devon with strength in proportion to their size. In hardiness of constitution they are equal to the Devon, though from their greater size they are not as well adapted to light pastures or thin herbage. In quality of beef they rank with the Devon, both being superior to the Short-horn. In milking qualities, also, they may be classed with the Devon. Both are beef-breeds rather than milk-breeds. The quality of their milk is superior; and the quantity yielded is probably equal to that afforded by any breed possessing an equal tendency to fatten. The superiority sometimes claimed over them for the Short-horns, as milkers, cannot be sustained, except by comparing the Herefords with a variety of Short-horns which are far inferior to them in fattening tendencies.

The Galloways are a Scotch breed of long standing and well-defined characteristics. They are polled, or hornless; of late years almost uniformly of a black color; round and long in the body; the fore and hind quarters nearly equal; the hide thick and mellow, and covered in winter with long, thick-set hair. In size, they may be classed with the larger breeds, as few excel them in weight. They are very hardy, and sustain themselves better on rough fare and under exposure to inclement weather than any other breed of the British Islands, except the West Highlanders, and in quality of beef they are only excelled by the last-named breed. The cows are middling milkers, and the milk is very rich. This breed has been introduced into Canada West, where it has more than answered all expectations, and is rapidly increasing in numbers.

The Ayrshires are described in an article which will be found in the supplement to this report.

Horses.—It appears from the returns, that the systematic breeding of horses has been but little attended to in the State. Stallions of different breeds or characteristics seem to have been used at different times, with no very definite ideas as to the purpose to which the stock to be bred should be applied. Every man who breeds a horse, should make up his mind beforehand as to the kind of animal he wants, and endeavor to select such a male and female as combine the points and qualities required for the object in view.

Many of the returns speak in favorable terms of the result of crosses with the Morgan stock, especially for the use of light vehicles on the road. There is no doubt as to the general advantage resulting from the use of the best stallions of this stock for the purpose named. Several of the returns speak also of the value of this cross in the production of horses for "all work." Where horses of the requisite size are thus obtained, there is no question as to their value for this purpose. But to obtain this size, considerable care would be required in the choice of breeding stock. The best type of the Morgan horse is the *beau ideal* of a New England roadster. It may be proper to say that the so-called Black Hawks are included under the term Morgan—the sire of Black Hawk having been the well-known Sherman Morgan. But it would be unreasonable to claim that a horse which is specially adapted to one kind of work should also be best for another. It does not even follow that the best roadster for New England would be the best roadster for all other sections. New England is to a considerable extent mountainous or hilly, and it is well known that comparatively small horses will bear fast driving down hill better than those of larger size. In a large portion of New England the roads are generally harder, better made, and less subject to deep mud than those of this State. Hence a horse of less weight would be required for the same purpose in the former section.

Without a more thorough knowledge of the horses of Michigan than the writer has yet acquired, he would hardly venture to say what are the principal wants in regard to this class of stock. It seems pretty plain, however, that a better kind of *farm* horses is needed. The steps to be taken to obtain them require consideration. In England and Scotland the horses which are chiefly used in farm work are of distinct breeds, kept for that purpose in connection with the heavy draft required in cities, &c. The favorite breed in England is the Suffolk (formerly called Suffolk Punch), and that of Scotland is the Clydesdale. What has been called the Old English Draft Horse--an animal of almost elephantine size—is still bred to some extent, and is occasionally met with in the wagons or drays of the London brewers; but his use on the farm has been almost entirely discontinued.

The Clydesdale horse is a well-made, strong-limbed animal, 16 to 17 hands high, and weighing generally from 1,600 to 1,800 lbs., though frequently reaching the weight of 2,000 lbs. and upwards. A few years since the Duke of Hamilton received the first prize at the combined show of the English Royal and the Scottish Highland Agricultural Societies, for the Clydesdale stallion called Sir Walter Scott, whose weight was upwards of 2,500 lbs. These horses are generally very quick walkers—are seldom driven out of a walk—and execute plowing and other farm work with great dispatch. They appear to be very strong in proportion to their size, and carry immense loads in carts and drays. They are also hardy, and keep in good order with ordinary fare.

The impression with our farmers is, that they do not require so large horses as these. And yet English farmers sometimes speak of the Clydesdales as "rather small," though in other respects admitted to be very good horses. But a cross with a medium-sized Clydesdale stallion on such mares as are generally used in Michigan for farm work, would not, probably, produce too large a stock. The experiment seems worthy of a trial.

The Normandy horses of France, particularly a variety known as the *Percheron*, have long been noted for their various good qualities. They are usually from fifteen to sixteen hands high, weighing from 1,200 to 1,300 pounds, though some of them reach the weight of 1,500 pounds. They are hardy, well adapted to farm work, and have so much activity that they are used for the post-coaches (*diligences*) of the country. Travelers in France have often been struck with the appearance and performances of these horses. The rate of speed at which they are driven with very heavy loads is extraordinary. Ten miles an hour is accomplished by the diligence teams. This rate of speed is not always accomplished at a trot; but the postillion, mounted on the near "wheel-horse," puts the animals through, under the loud crack of his short whip, in the allotted time, whatever the gait in which they choose to go.

The Massachusetts Society for Promoting Agriculture made an importation in June last, of two stallions and three mares of this breed, selected by a special agent in France. One of the stallions—"Conqueror," four years old—is of unusual size for the breed. He weighed, on arrival, 1,470 pounds; on the 15th of December, 1,500 pounds; height, 16¾ hands. The other stallion—"Orleans," four years old—weighed, on arrival, 1,270 pounds; on the 15th of December, 1,320 pounds; height, 15¾ hands. He is a horse of remarkable compactness, with points indicating great strength and hardiness of constitution, and is a good trotter. The mares weigh from 1,200 to 1,400 pounds each.

There is reason to believe that this breed of horses would be a good one for farm purposes in this State. A cross of common mares with Percheron stallions would be likely to produce useful stock. But direct experiments only can determine how the stock which will best answer our requirements can be obtained.

Swine.—The general inference to be drawn from the statements received, is that medium-sized hogs, which fatten readily, are most profitable. Several of the returns speak of the want of attention to the proper breeding of hogs. In the appendix to this report there will be found a chapter in which different breeds are described.

Manures.—The inattention to the saving of manures, as indicated by the returns, is a serious defect in the agriculture of the State. The liquid excrements of domestic animals seem to be to a great extent wasted. So far as demonstrative experiments have been made, the urine of animals, properly used, is of as much value, in reference to its fertilizing effects, as the dung. By the waste of this, therefore, one-half the value of the manure which might be obtained from our farm stock is lost. But even this great loss is not all that is in most cases sustained. In the ordinary mode of management, the solid excrements are so treated that their manurial value is greatly deteriorated. Exposed as they too frequently are to alternate freezing and thawing, washing and drying, a large portion of their soluble properties is extracted before they are applied to crops.

The question of the best mode of managing farm manures is one of so much weight in regard to the interest of the farmer, that it would require more space than can be here allowed to discuss it in all particulars. The main object should be to prevent waste. Where plenty of straw can be had, proper littering of the stock with this substance in the barn, and a proper spreading of straw in the yards—the latter being well constructed—will save the greater portion of the solids and liquids. Where straw cannot be had, muck, or some other absorbing substance, should be so used as to take up the urine in the stalls, and as the manure accumulates it should be protected from the washing of rains by being kept in large heaps in suitable places. These remarks are made on the supposition that barn-cellars for keeping manures are not available. They are the best reservoirs for this purpose.

It does not appear that any attention is given to other manures than the ordinary ones of the farm, except plaster, and, in a few instances, wood ashes. In regard to plaster, the testimony in regard to its profitable application is almost unanimous, and it is to be hoped that its use will be greatly extended. This State, fortunately, has an inexhaustible supply of this substance, equal in quality to any known. In a visit to the quarries near Grand Rapids, in July last, the writer received from Mr. Hovey, agent of the Grand Rapids Plaster Company, some interesting facts in regard to the plaster business at that place. It appears that there has been for several years a constant increase in the quantity of plaster sold. The number of tons sold annually for the last four years, (the financial year ending June 1st,) is as follows: 1861, 8,132; 1862, 9,223; 1863, 13,713; 1864, 15,059. It will be seen that the quantity sold the past year was nearly double that for the year ending June 1st, 1861. Mr. Hovey states that 3,000 tons more could have been sold in 1863, if the Detroit and Milwaukee Railroad could have furnished the cars required for transportation. As railroad communication is opened with different parts of the State, this valuable fertilizer will be brought within the reach of farmers who have formerly been unable to procure it, and its use will probably be greatly increased. As an auxiliary to the ordinary manures of the farm, there can be no question as to its utility.

How far ashes can be advantageously used as manure, must be decided by trials. In many parts of the State great quantities of old leached ashes can be had for nothing. In other parts of the country it has been found that such ashes are of great value, especially on sandy and gravelly soils. Experiments with them are desirable here.

Bones, which constitute so prominent an article in commercial manures in England, and also in some of our Eastern States, are probably not much used here. The comparative newness of the soil renders the application of phosphate of lime—which is the most valuable element of bones—less necessary here than in districts which have been longer cultivated. But measures should at least be taken to prevent the waste of the bones derived from animals slaughtered within the State, Where mills for crushing bones are not accessible, they may be readily reduced by covering them with strong wood ashes, or by mixing them with manure which will ferment strongly—covering the mass with muck or soil, to prevent the escape of ammonia.

Wood-land.—The great increase in the value of wood-land and the different kinds of timber, spoken of in nearly all the returns, is very gratifying. For a long time from the first settlement of the State, the magnificent forest which covered a large portion of the soil was regarded as an incumbrance, and greatly retarded cultivation. The prairie States presented the inducements of more immediate returns for a small amount of labor, and the timbered lands were to a considerable extent passed by. But, as the growth of the country has advanced, the relative advantages of prairie and timber lands have been constantly changing in favor of the latter, until at last the timber which was formerly regarded as a formidable obstacle to profit, is in most instances an immediate source of income. The great commercial emporium of the Northwest, Chicago, as well as other cities, and a vast breadth of the prairie country occupied by the rural population, must depend to a great extent for fuel on the forests of Michigan. This, without reference to the increasing demand and high prices of lumber of various descriptions, will impart to every tree in this State a degree of value. In reference to lumber, those portions of our country which can afford a surplus are becoming every year more and more restricted. The supply from the pine forests of Maine is greatly diminished, while that from other portions of New England is nearly exhausted, and that from the State of New York is rapidly decreasing.

But the timber of Michigan confers other value on the land, or possesses other value of importance to the farmer. There is no question that, as a general rule, land which produces large trees of various species, except resinous trees, possesses more of the elements of fertility than prairie land—in common parlance, it is *stronger* land. It is admitted to be better for grass and for fruit trees. Every one may have noticed how much more readily the forest land becomes swarded over to grass, and how much more permanent and lasting is the sward. It is not alone the protection which the forest affords to fruit trees, however important that may be, which constitutes the value of timber land for the production of fruits—the soil is evidently better adapted to their growth. The particular advantages of Michigan for the production of apples, pears, etc., have already been mentioned.

Other advantages of the forest are, that it has supplied the settlers with cheap fuel, and with the cheapest and best means of fencing the land, and of constructing most of the buildings. In regard to fences, it may be remarked that a good *dead* fence is preferable to a *live* one, in many respects, though it will not be denied that live fences are, in many situations, expedient. But live fences must derive their constant support from the land, and if it were true that they draw from it moisture only, there are seasons, like that just past, where even this becomes a precious substance. But the exhausting effect of hedges is shown by the comparative unproductiveness of the land along their lines.

The advantages of the forest as a means of protection to crops and animals, are seldom fully appreciated. Few cultivated trees or crops can stand the full sweep of our most severe winter winds. This is shown by the destruction which not unfrequently occurs in fruit trees on the prairies, and the uncertainty attending the cultivation of winter grain there. The difference caused by the protection of forest trees, in the same latitude, though not easily computed, is obviously great. The winter of 1863–4 will long be remembered for the passage of a "cold wave" over the prairie States, which inflicted much damage and suffering. In those States, the destruction of vegetable and animal life was much greater than in this State, the difference being chiefly attributable to the different conditions of the two sections in reference to timber or forest. In portions of Illinois, the loss of sheep by the extreme cold was stated to have been from ten to twenty per cent., while the loss in this State was comparatively trifling.

The beneficial effects of forest-trees for the purpose above alluded to, may be strikingly shown by reference to Scotland. Previous to the commencement of this century, a large portion of that country was comparatively destitute of trees, and so exposed to the cold winds which almost constantly swept its surface, that the soil was comparatively unproductive. Some leading land-holders, fifty to sixty years ago, commenced the planting of belts of timber, as a means of shelter. The first of these experiments was so successful that the course was very extensively followed, and with the most gratifying results. Large tracts, which were totally unproductive, or which afforded at best only a precarious support to a few deer and sheep, have been brought into cultivation, and in connection with drainage, are made to produce abundant crops of oats, barley, and sometimes wheat, while they afford fine pasturage for cattle. The timber on these artificial plantations has become valuable for various purposes. Thus the portion of the land devoted to timber has been made highly profitable, while the productiveness of the remaining portion has been so increased, that the profits from it far exceed those formerly derived from the whole.

In this State, there can be no doubt that if proper judgment is used in the selection and preservation of wood-land, the requisite quantity of fuel, lumber, &c., may be secured, leaving the timber in such situations that it will afford the necessary protection to crops. With the exercise of due care in cutting off the trees, and by securing the ground against fires and the encroachments of cattle, there will spring up a new growth, which will continue the desired protection and keep up the supply of wood.

Drainage.—It is gratifying to learn from the returns, that drainage has been commenced in various sections. It may be mentioned that in some districts from which no returns have been received, the writer found, by visits made last summer, that this system of improvement had been adopted to a considerable extent. It is by no means intended to assert the necessity of drainage on all soils, but there is a large portion of the State on which it is required. On the farms of Mr. Lyndon, of Plymouth, Wayne county, who has laid fifteen miles of drains; Mr. Greene, of Farmington, Oakland county; Mr. Carpenter, of Blissfield, Lenawee county; Pro. Welch, of Ypsilanti, and Mr. Uhl, of the same neighborhood, and others, the most satisfactory results have been realized from tile-drainage. These favorable examples will probably lead to further outlays, the benefits of which cannot be doubted.

High Cultivation—Irrigation, etc.—In a new country, the cheapness of land generally operates against very high cultivation. It has probably been so in this State, and it is not unlikely that the advantage to be derived from comparatively large outlays on small tracts near cities or towns, has been too much overlooked. As favorably illustrating this point, in connection with the benefits of irrigation, when judiciously practised, some notice of the management of a small piece of land by Edward Wheeler, of Kalamazoo, is here introduced. It will be best understood by the following extract from a communication of Mr. W.:

"Agreeably to your request, I send a statement of my gardening matters for this year. All the products have been obtained from one and a half acres, though I have a little over two acres under cultivation. Half an acre is occupied by a new strawberry-bed, and a few other articles, affording no income this year. The soil is very black, and when saturated with water, it may be said to resemble black-lead and tar; but it dries wonderfully quick, so that it can be worked very early in the spring, and immediately after heavy rains, without the least danger of baking. The soil consists largely of muck, well decomposed, mixed with white and yellow sand. In the summer, it gets excessively hot from the sun's rays—enough so to destroy vegetation entirely, were it not for the irrigation employed. A small portion of the ground has been trenched twenty inches deep, and the other portion has been worked to the depth of fourteen inches. Until last year (1863), very little manure had been used on the tract. Last fall and spring, I forked under about one hundred large wagon loads of barnyard manure. I also use large quantities of leached ashes, which I consider valuable on this soil. The water used for irrigation is obtained from a small stream, called Arcade creek. The ground is laid out in beds eight feet wide, with a shallow water-trench between each bed. The trenches can also be used for paths, as the water is in them but a few minutes each day. In watering, I avoid soaking the ground as much as possible. My plan is to fill one trench at a time, as full as it will hold. As soon as the water fairly reaches the farther side of the grounds, I turn it into the next trench, and so on, till all the ground is watered that needs it. This is my general mode of watering. With strawberries, during fruiting season, I sometimes throw, from one of the full trenches, a small quantity of water immediately upon the beds. I use a basin with a handle, and throw the water in such a manner that it falls in spray, like rain, thus avoiding the washing of dirt on the fruit. I raise mostly the Wilson variety of strawberry; have raised at the rate of four hundred bushels per acre. The Wilson bears well the first year after the plants are set out; after that, I have found them nearly worthless, and now adopt the plan of allowing them to bear but one crop, and then dig them under. In fact, I prefer making a new bed to clearing out an old one. With the Wilson, I never cut the runners, but set the plants in rows two feet apart, and eighteen inches in the row; then allow them to fill in between. I find more difficulty in getting plants enough than in getting them too thick. While the strawberries are in blossom, I sow on dry, unleached ashes, which greatly improves the quality of the fruit. Though I have mentioned the Wilson as the variety which I prefer for general cultivation, I raise several other kinds. In figuring the yield of my carrots and parsnips, I find it to be 1,250 bushels per acre. For cultivating through the summer, I use a steel rake, beginning as soon as a weed appears, and continuing until no further stirring is required. Instead of ploughing, I do all the first working of the ground with a fork. The ground is nearly level, with one foot fall toward the north. My green-house is small, only of sufficient size to start a few plants for early setting. The following list comprises the articles sold for the present season (1864), and the sums obtained:

"Cabbages, $51 47; beets, $88 42; sweet-corn, $69 24; peppers, $5 48; tomatoes, $122 18; China beans, $4 36; pie-plant, $17 98; parsnips, $42 34; vegetable eggs, $28; summer squashes, $22 27; winter squashes, $15; cucumbers, $92 42; nutmeg melons, $42 30; onions $87 72; onion-sets, $2; currants, $31 47; peas, $125; strawberries, $166 62; raspberries, $4 25; carrots, $33 06; asparagus, $24 18; tomato-plants, $21 37; cauliflowers, $9 80; gooseberries (nearly all destroyed by birds), $1 13; salsify, $5; garden-seeds of various kinds, $20; tobacco, $100; making a total of $1,431 16."

Suggestions for the Advancement of the Agricultural Interest.—It cannot escape the notice of a careful reader of the returns, that a more thorough education of the farming class is generally mentioned as a matter of the first importance. At this day, an argument in favor of such education is not needed. Evidence is everywhere met with that the measures which have been adopted by the State in reference to this end, are in principle sanctioned by the people. They demand that there shall be a constant advance in this direction; that the best means for enabling the farmer to understand the theory and practice of agriculture, shall be placed within his reach. The report in regard to the State Agricultural College will afford a gratifying view of the progress made in this important field, so far as relates to the operations of that Institution.

Agricultural Resources of the State.—Considering Michigan in reference to the principal elements of agricultural prosperity, it may be remarked: 1st, That the main body of the territory is favorably situated as to climate; 2d, That few sections are so fortunate in reference to the character of the soil, especially as to its adaptation to a variety of products; and 3d, That being almost surrounded by navigable waters, she has ready access to markets, and unusual facilities for communication with other sections. Important channels for internal intercourse have already been provided, and others are in progress. If, in addition to these points, we take into view the unbounded mineral wealth of the State—the iron, copper, salt, gypsum and lime, to say nothing of the coal and petrolium—the bearing of all which on the farming interest is of immense importance, it must be admitted that in all the natural elements of a flourishing agriculture, the State is eminently favored.

It is true that the past season was, on the whole, less favorable than usual to our farmers, the crops having been seriously injured by drought, except in a few of the southeastern counties of the State. But such unfavorable seasons so seldom occur that they need not discourage agricultural enterprise. Judging from all the circumstances which affect the operations of the farmers of Michigan, they may continue their labors with every reasonable expectation of an abundant reward.

STATE AGRICULTURAL COLLEGE.

The Congressional Land-Grant, passed in 1862, giving to each loyal State a portion of the Public Domain for the establishment of institutions for teaching the science and practice of agriculture, &c., has excited great interest. Various States have availed themselves of the provisions of the act, and taken steps to establish such institutions. That this State should have taken the lead in this laudable and now popular movement, must be a matter of pride to all well-wishers to its prosperity. Of the 240,000 acres of land which the State received from the General Government, about 150,000 acres have been located, the particulars in regard to which may be found in a report of the Commissioner of the State Land Office, herewith appended.

The swamp-lands belonging to the College are being sold, the proceeds of which are held for permanent investment, and for the improvement of unsold portions, by drainage. The sales, thus far, have been of detached lots, on time, the receipts from which are $1,503.

The system of in-door instruction, pursued at the College, was described with so much particularity in the report of last year, that it seems unnecessary to go into details on that subject, at this time.

In the management of the College Farm and Garden, two leading objects are embraced: First, the production, in the most economical way, of such articles as are needed in carrying on the Institution; second, the settlement of questions connected with the principles and practice of agriculture and horticulture.

In regard to the first object, it is intended that the processes or operations shall be based, as far as practicable, on what are deemed to be established facts. We say so based as far as practicable, because in the various circumstances connected with a new farm, taken from the forest, there are obstacles which interfere, more or less, with the adoption of systems which should be followed on farms that have been cultivated a long time. A proper rotation of crops, for instance, cannot be practised advantageously until a certain extent of land, of suitable character for alternate husbandry, can be brought into such a condition as is required for the various crops comprised in the rotation. So, too, in regard to the use of labor-saving implements and machinery. It is obvious that, however important they may be in reference to general economy, we cannot avail ourselves of them till the cultivation of the farm has advanced to a proper degree, and for this a certain length of time is required. On the older portions of the farm, the stumps have so far decayed that the greater part of them can be eradicated with comparatively little expense, and when this is done, a general smoothing of the surface will be attempted. For two seasons, the principal part of the hay has been cut with the Buckeye mowing-machine, though not without considerable trouble from the stumps and the unevenness of the ground. The horse-rake has also been used to some extent. Last autumn we were able to use the "roller grain-drill"—of which mention is made elsewhere in this report—on a portion of the land seeded to wheat.

The selection of crops is governed mainly by our wants, modified, of course, somewhat by the fitness of the soil for particular kinds, and the general cultivation is that which, so far as can be judged from experience and observation, would be likely to produce the best returns. In the general selection and management of stock, also, it is intended to pursue mainly that course which is regarded as most favorable to immediate profit.

In regard to the second object—the settlement of questions—less has been done or attempted, thus far, than would have been under more favorable circumstances. Formerly the farm seems to have been considered mainly as a place where the students could work—partly for the benefit of their health, but principally as a means of lessening the expenses of their education, by obtaining pay for their labor. Scarcely an attempt was made to make it an experimental farm, or one for illustration. It is true, as above intimated, that if this had been made an object, but little could heretofore have been accomplished, owing to the comparatively rude state of the farm, and the impracticability of systematising operations. But the time is coming, and, indeed, now is, when, with the facilities which may be provided, this important field may be entered on, and work commenced and prosecuted to results of the highest value. We may here refer to experiments commenced in 1863, under the direction of the Chemist of the College, Dr. Kedzie, the results of which, so far as obtained, were comprised in his published report of last year. The trials in reference to clover and grass were continued the present year, and a report of them will be found in a supplementary paper herewith submitted.

In the experimental department of the farm, the aim, of course, is not immediate or direct profit; it is simply the determination of questions on which positive knowledge does not now exist. These questions are too numerous to be here enumerated. Some of the more prominent are—the relative value of different breeds of horses, cattle, sheep, swine and poultry for special purposes; the best methods of feeding animals for different objects, including the relative cost of different crops, and their relative value for the production of flesh, milk, wool, &c.; the soils and methods of cultivation best adapted to different crops, including ploughing at various depths, subsoil-ploughing, trenching, &c.; the best methods of preserving and applying various manures, and their relative value for different crops on different soils. The testing of ploughs and other implements in reference to their adaptation to different purposes, is a matter which should receive attention, though but little can be done in regard to it till the general cultivation of the farm has been considerably advanced.

The importance of these questions is self-evident. Yet, but little is absolutely known in regard to them. It is also evident that the questions cannot be settled to much extent by private enterprise—the labor, care and expense involved being too great to be encountered by individuals, especially when no monopoly of the benefits of a solution would be enjoyed. It is manifestly one of the duties of public institutions to do what cannot be done by individuals. It is in this way only that they can fully accomplish the objects for which they were organized. The settlement of questions requires time; some of the experiments would have to be repeated for several years, and the most strict attention should be given to all the details of management. Men who are in all respects capable of conducting such experiments, are rare. The expense with which the experiments are attended, is, of course, considerable. Those which have for several years been carried on by Mr. Lawes, of Rothamstead, England, have involved an annual expenditure of $15,000, an amount which few private purses could sustain. In the case of Mr. Lawes, the results of the experiments have been bestowed gratuitously on the world, and though the number of questions actually settled is comparatively few, there can be no reasonable doubt that the value of the facts elicited far overbalances the cost.

The settlement of such questions as have been mentioned, involves the necessity of keeping on the farm different varieties of the various species of domestic animals. A primary object would, of course, be the selection and propagation of those kinds which, from all that is known of them, might be expected to be most profitable for the special purposes in view. But to demonstrate the actual difference, experiments should include different breeds, and their treatment should be so varied as to embrace, as far as possible, all the conditions under which it is expedient that animals should be kept. It is desirable, also, that a few specimens of animals of characters or breeds the general keeping of which it may not be deemed proper to encourage, should be kept for illustration; to show students and others what they are, why they are not adapted to specific purposes, and in what particulars other animals are superior to them.

There is another point closely connected with the second object above specified, viz: the instruction of students in the practical manipulations of farming, based on what are regarded as well-grounded principles. The study of elements, so far as they are laid down in books, is required in the outset, but in the application of principles the student must become familiar with practice. He must not only see the work done and assist in its performance, but he should understand the reasons for doing it in a particular way, and the objections to doing it in other ways. Hence, field-lectures—lectures embracing instruction in reference to labor—are required. Suppose, for instance, that a piece of ground is to be prepared for a particular crop: How shall it be plowed—into what condition is it desirable to bring the soil by the plow, for the crop in view, and what *kind* of plow will best accomplish the object? The special operation of plows of different patterns may be shown in this connection. According as the work done approximates to the desired standard, the reasons why each implement performs work of peculiar style—why one does well and another does not—should be explained by reference to the manner in which the implements are constructed, as to shape and the relations of the different parts. In this connection it should be shown, also, that the adaptation of ploughs to different kinds of soils, or to the different conditions of soils as to their texture, freedom from stones, their smoothness or roughness of surface, etc., depends on the construction of the ploughs. Following up the plan of instruction indicated, all the processes involved in the cultivation and securing of a crop, should be discussed and explained.

To carry out this system, certain things are necessary in the beginning. Before the various kinds of plows, and other implements, can be used to advantage, or the particular results dependent on their construction demonstrated, the land must be brought into a suitable condition. While the surface is covered with stumps, and the unevenness which necessarily accompanies a "stump farm," exists, the implements which can be used are but few, and they are in various respects different from those which would be best adapted to the same land when the rough places have been made smooth.

To illustrate the relative merits of different breeds of animals, and the relative advantages of different modes of feeding, proper accommodations must be provided, including shelter, and the facilities for preparing and administering food. Until within a short time, these have been almost wholly wanting, and they still fall much short of what is actually needed. Until the erection of a shed during the last summer, there was not shelter for the cattle which were indispensable to the management of the farm. In regard to sheep, nothing has been attempted till the present year. We have a few fine specimens of several breeds. It would be desirable to increase them, and to make the farm a nucleus from which should be disseminated the best breeding stock of all the varieties wanted in the State. But this cannot be done till we have proper accommodations. At present, we have only the shelter of temporary shanties for the greater portion of the flock. To keep the different breeds of the various classes of stock distinct, and to provide means for experiments in feeding, etc., more room is required than is ordinarily necessary for the same number of animals.

In regard to swine, the accommodations are very defective as to the comfort and thrift of the stock, the economy of feeding, and the saving of manure. To be able to demonstrate the relative value of different kinds of food, variously prepared, a properly constructed piggery is required, with apparatus for cooking, fermenting, etc.; and to keep the animals in the way in which their characteristics would be fully developed, and in which they would afford most profit, they must be protected from the inclemencies of the weather.

There are on the College Farm specimens of the Short-horn and Devon cattle, as described in the report of last year. In

November of the present year, a young bull (Donald Dhu) and heifer (Merryton 4th) of the Ayrshire breed, were purchased of the well known importer and breeder, Henry H. Peters, of Southborough, Mass., and are now on the farm.

A ram and three ewes of the South Down breed of sheep have been obtained from Henry Birge, of Drayton Plains, Mich. Specimens of Merinos have been obtained from Hon. Charles Rich, of Lapeer, Mich., whose flock is directly descended from that of his father, the late Hon. Chas. Rich, of Shoreham, Vt., a flock well known as the source from which many of the best Merino sheep of Vermont originated. By the liberality of the distinguished importer and breeder of Silesian Merino sheep, William Chamberlain, of Red Hook, N. Y., we are in possession of an excellent ram of that valuable variety. For the purpose of testing various questions, and for the production of meat for consumption on the premises, a number of *grade* sheep have been procured.

Various experiments in breeding have been commenced with the different kinds of sheep, and they will be continued and extended according to the means and facilities at our disposal.

The past season was, on the whole, very unfavorable to the productions of the farm, on account of the severe drought. The meteorological record kept at the College, shows that the quantity of rain which fell from the 10th of May to the middle of September, was very small. In fact, during all this period the rains which fell in a few days in the latter part of June, were all that afforded much benefit to vegetation. But the ability of a large portion of the farm to withstand drought to a remarkable degree, was satisfactorily demonstrated. The pastures, to a considerable extent, continued to produce good feed after grass over much of the surrounding country was nearly dead. The hay crop was a middling one over most of the land on which it grew, and being chiefly cut early, a very good second growth followed, the yield of a portion of which was 3,500 pounds to the acre of well-cured hay.

The wheat raised was the first crop on new land, much of which was occupied by stumps. It was seriously injured by the winter, and in April was very unpromising; but the yield was seventeen bushels to the acre, of fine quality. Owing to the extreme wetness of the fore part of the spring, but little seeding or ploughing could be done till very late. Nine acres sown to oats, on the 21st of May, yielded forty-five bushels to the acre. Six acres planted to corn, on the 28th of May, yielded thirty bushels to the acre, although but one rain, sufficient in quantity to benefit the crop, apparently, occurred from the time it was planted till it was cut and shocked.

Some experiments in root culture were attempted. A portion of the ground designed for this purpose was sown to carrots, parsnips, and different kinds of mangel wurzel; but so few of the seeds vegetated, that the ground was subsequently (July 8th.) sown to turnips of various kinds, as the Golden Ball, Dale's Hybrid, Yellow Aberdeen, Long White French, and Skirving's Improved Swede. For five weeks after they were sown, less than half an inch of rain fell; consequently, there was a very poor stand of plants. But on a moist spot of the lot devoted to the Golden Ball, the yield was at the rate of 1,139 bushels to the acre. Bulbs of this and of the Yellow Aberdeen variety, weighed from twelve to fifteen and one-half pounds each. The yield of some of the other varieties would probably have nearly equalled that mentioned, if the plants had stood well, and they had been sown early enough. They were not sown until the failure of the carrots, etc., was manifest.

Parts of the farm would be greatly benefited by underdraining, as proved by the results of trials already made in the garden and elsewhere. Drains are needed wherever the soil is of such tenacity that it bakes under drought, wherever grain is "winter-killed" by the upheaving of the roots, and wherever aquatic plants flourish.

Of the new implements which have been tried, some have already been spoken of, and others will be more fully noticed in the appendix to this report. Sanborn's Turn-wrist Plow has a reversable wing to prevent the earth from running over the top of the mould-board, which is a decided improvement on the ordinary side-hill plow--a form of plow which it is well known has various advantages The Buckeye Mower has been used with great advantage, notwithstanding the obstacles encountered. Dana's ear-labels, for sheep, consist of small pieces of metal which are inserted in the ear. They seem to answer, perfectly, the purpose for which they were designed. Todd's stamps for marking sheep consist of iron letters and figures, with stems to them which answer the purpose of handles, and the letters or figures, being dipped in coloring matter, are applied to the body of the sheep. This is a very convenient way of marking. Farmer's root-cutter, manufactured by F. A. Flower of Pontiac, cuts easily, by the force of one man, two bushels of turnips per minute, in strips half an inch thick and an inch and a half wide. An excellent machine.

The gardens, under the charge of Prof. Prentiss, have produced well. The good effects of underdraining, done last year, have been very evident, especially in the earlier growth of vegetation, and the more friable condition of the tenacious portion of the soil, which enabled crops to better sustain themselves under drought. The upland rice obtained from the Commissioner of Agriculture (Washington) was sown, but the drought destroyed the plants. A trial of a variety of potatoe called the New Peach-blow, showed a yield of 343 bushels to the acre. Tomatoes, sweet potatoes, and other vegetables, were never so abundant, nor of better quality, than this year.

The apple orchard has made a vigorous growth the present year, but is still too young to furnish a supply of fruit. Ninety standard pear trees, representing twenty-two varieties, and one hundred dwarf pear trees, representing thirty-six varieties, were set out last spring. Eleven of the trees are dead, and their places will be supplied by other trees. A large number of plants that served to illustrate the principles of botany and horticulture, and adorned the grounds and college class-rooms and halls, are, with regret, given over to perish for want of a green-house. Such a structure is much needed for the propagation of plants for the College and for distribution, for experimenting, and for the instruction of classes. It is to be hoped that another year will not pass without the erection of so important an appendage to the Institution.

Meteorological records have been kept by Dr. Kedzie, in the fullest manner, in accordance with plan adopted by the Smithsonian Institute. The report on them is herewith submitted. L. A. Hurlbut, a member of the freshman class, has been employed for the season, during work-hours, in procuring, stuffing, and mounting birds and small animals. He has put up the specimens in a creditable manner.

The Library has been increased by a complete set of Silliman's American Journal of Arts and Sciences, and various other works, but it is far from being what the Institution needs. One is wanted that is up with the times in all branches of study in which instruction is given in the College.

Lectures have been given statedly on farming operations, and on the selection and care of stock—sometimes in-doors and sometimes in the open air—by Dr. Miles and the Secretary. Instruction has been given on stock-breeding, agricultural chemistry, &c., in accordance with the course of study. Five young men received the degree of Bachelor of Science this autumn, making the third class that has regularly graduated at the Institution.

We are indebted to the following gentlemen for additions to the College Library: Messrs. Chandler, Howard and Longyear, members of Congress; Hon. J. Newton, Commissioner of Agriculture; S. L. Goodale, Secretary of the Maine Board of Agriculture; W. C. Flagg, Secretary Illinois Horticultural Society; Dr. Eben Wight, Corresponding Secretary Massachusetts Horticultural Society; John W. Chambers, of the American Institute, N. Y.; Luther Tucker & Son, publishers of the "Country Gentleman and Cultivator," Albany, N. Y.; Messrs. J. C. Holmes, E. Tenney and C. B. Stebbins. Also, to the Essex

Institute; Agricultural Society of Lombardy, Italy; Smithsonian Institute, and Harvard College.

Through the liberality of the publishers, the reading-room has been regularly supplied with the "Lansing State Republican," "Hovey's Magazine of Horticulture," "The Horticulturist," "New England Farmer," "Prairie Farmer," "Wisconsin Farmer," "Weekly Railroad Record," "Sturgis Journal," "Michigan Argus," "Detroit Commercial Advertiser," "Wolverine Citizen," "Ann Arbor Journal," "Romeo Argus," and the "Bay City Semi-Weekly Press and Times."

For the Museum we have received the following: From William Duane Wilson, picture of Iowa Agricultural College; from Senator Buel, crystals of lead—very fine; from George R. Congdon, box of specimens of Grand Rapids limestone—very fine; from Smithsonian Institute, Washington, D. C., specimens of American fresh-water shells, and specimens of stones used in the construction of public buildings in Washington.

Donations of animals, implements, &c., have been received as follows:

Seth A. Bushnell, Trumbull county, Ohio, Chester-white sow;

Hon. John Wentworth, Chicago, Ill., Suffolk boar;

Henry Birge, Drayton Plains, Mich., South Down ram;

A. S. Brooks, Novi, Mich., Merino ram and ewe;

Hon. Charles Rich, Lapeer, Mich., Merino ram and ewe;

E. J & P. White, Lapeer, Mich., high-grade Merino ewe;

Hon. Wm. Chamberlain, Red Hook, N. Y., Silesian ram;

Wm. A. Dryer, Lansing, Mich., four high-grade Merino ewes;

Edwin Hammond, Middlebury, Vermont, samples of wool from his celebrated Merino sheep;

T. A. Flower, Pontiac, Mich., Farmers' root-cutter;

Ames Plough Company, Boston, Mass., Sanborn's turn-wirst plough;

S. E. Harrington, Greenfield, Mass., Harrington's "convertible seed-dropper and hand-cultivator," not yet tried here;

Wheeler, Melick & Co., Albany, N. Y., Palmer's horse pitchfork;

Wm. Chamberlain, Oberlin, Ohio, right to use Hayne's portable fence;

E. T. Hickman, Newcastle, Mich., right to use Tufts' patent fence;

Reuben Hurd, Springfield, Ill., an article called "the American hog-tamer;"

C. H. Dana, West Lebanon, N. H., ear-labels for sheep;

A. Todd, Jr., Ontario, Wayne county, N. Y., stamps for marking sheep, and hoof-shears for sheep;

F. Van Doren, Adrian, Mich., hand corn-planter;

Robert Hale, Chicago, Ill., right to use Hale's patent sheep-rack;

A. S. Brooks, Novi, Mich., superior black oats;

S. S. Bailey, Grand Rapids Mich., early Boughton wheat;

J. H. Hawley & Co., Pontiac, Mich., Hurxthal & Lee's self-opening gate;

D. Goodsell, Cleveland, Ohio, Jones' seed-dropper.

SANFORD HOWARD,

Secretary of the Michigan Board of Agriculture.

REPORT

OF THE

FACULTY OF THE STATE AGRICULTURAL COLLEGE.

[EXTRACTS.]

Accompanying this report, we present to the Board the various reports on the management of the farm, and of the several gardens, and of the stock, which have come before the Faculty for their action the present year. We also present the reports on experiments, and the meteorological record kept by Dr. Kedzie, according to the forms recommended by the Smithsonian Institute,—similar to those published in connection with the report of the Board.

LABOR REQUIRED OF THE FACULTY.

The Board requested, some time last year, a report from the Faculty on the workings of the new system inaugurated last season for the uniting of labor and class-room instruction. One of the most obvious results has been to add very largely to the labor of the officers of the College. When two classes were nearly enough alike in qualifications, they have sometimes been united in branches of study not essential to the scientific character of the Institution.

The plan for the management of the work done by students may be found in the report of the Board for 1863, pages 45 and following; the departments of instruction may be found on the 81st page; while the general plan on which the Institution is conducted, is given in the same report, pages 8 to 18.

This plan threw no such studies out of the course, but lessened the time devoted to them by the professors of the College.

In a literary institution, an approximation to the amount of labor required of the instructors may be gained by comparing their number with the course of study; for the duties of the professors are, to a large degree, confined to the class-room. But an estimate made in this way would obviously be unjust in regard to any school of practical industry. It has been necessary to assign out-of-door superintendence and instruction to nearly every one of the College officers. One or two instances will show how much as been required of the members of the Faculty, if it be remembered that the entire amount of labor was divided amongst them as equally as possible.

The Professor of Animal Physiology is also Superintendent of the Farm. He has had charge of the stock, and of the sales and exchanges of it; plans to mature in regard to the management of the farm, the three hours daily labor of students to superintend personally, and instruction to give in the field in manual operations, and in the use of tools. He has given a course of lectures on farming operations. In addition to this, he has had his usual class recitations in studies, requiring not only class-room exercise, but investigations with his class in field and forest. The labor of instruction is much increased from the lack of proper text-books. It is so, also, in nearly all the departments. The application of the sciences to agriculture have not been taught to classes in years past throughout our land, or elsewhere, and suitable books are not yet written. Consequently, the labor of imparting instruction is largely increased.

The Professor of Agricultural Chemistry has had to give instruction principally by lectures. He has had agricultural experiments to superintend, meteorological records to keep; he has had a class in Elementary Chemistry, one in Agricultural Chemistry, and one in Analytical Chemistry; to teach; he has had, for one-half year, to superintend personally the practice of his class three hours a day in chemical analysis; he has given a course of lectures on the application of Chemistry to the Arts, and another course on Military Hygiene, and still it was found necessary to assign to his care a class in another study, wholly removed from the range of his own professorship.

The Professor of Botany has charge of the several gardens belonging to the College, the College grounds, the three hours of daily work of students in the garden to superintend personally, daily in-door lessons to hear, the weekly military drill to conduct, and lectures to give. And yet, as before stated, the labor has been equalized as far as possible between all the officers.

It is evident from these statements that, for the highest efficiency of the Institution, a further division of labor should be made as soon as the condition of the College will warrant it. The Superintendent of the Farm must not give half his time to instruction in the classification of animals, in geology, and other branches not belonging to his own professorship. The department of chemistry must be divided into several distinct fields of labor. A civil engineer, a geologist, an entomologist, a professor of meteorology, and one of veterinary science, must take their places in the Faculty of Instruction.

The Faculty do not, however, recommend the enlargement of the corps of instruction for a year or two to come. For, the farm and the gardens fitted for experiment and illustration, the stock and buildings necessary for carrying out the objects of the Institution are all so indispensable to the instruction which the Faculty should give, that we think it best to expend upon these objects a large portion of what the State may appropriate to the Institution. The grounds should be made a model of taste; the fields should be fitted for experiments; additional buildings for the protection of stock are greatly needed; additions of choice stock are essential; a propagating house for plants, and other means of illustration and experiment, are necessary for the accomplishment of the legitimate aims of an Agricultural College.

INFLUENCE OF THE LABOR SYSTEM ON THE STUDENTS.

We think we see evidences that the uniting of in-door and out-of-door instruction upon the same persons, is working a salutary change in the condition of the College, and in the spirit of the students. The tendency of the College has ever been to decline from its legitimate work of teaching the sciences for the sake of, and together with, their applications, into a manual-labor school, characterized otherwise only by the predominance of the sciences in its course of study. This was the inevitable result of having one set of men to give in-door instruction, and leaving the out-of-door work, the exemplifications of principles, the practical applications, to the care of a separate body of men. Supposing the superintendents to be men of equal learning and ability with those employed in class-room instruction, as they have sometimes been, still, in exciting the interest and influencing the taste of the pupils, the in-door professor has every advantage over the superintendents. First, there is the too prevalent opinion that books are the only fountains of knowledge. The tendency of object-lessons, which now engage so largely the attention of educationists, will be to overcome this prejudice, and teach the important art and habit of observation. Object-lessons, for the most part, are, however, as at present conducted, but book-lessons, and the memorizing of terms and propositions, under a somewhat new form. Established prejudices readily take possession of the very forms which were intended to exorcise them.

Again, there is fascination in the perception of truth as it appears in system. A systematic presentation of science is usual in the class-rooms, but is almost impossible in the field of actual labor.

Again, the text-book, or the notes taken at the lecture, give fixed limits to the student's daily study, and make the subject matter of it clear to his view. Then comes the daily class-exercise, which insures on the part of the student the careful preparation of his well-defined task.

When now the student goes to view field-operations, or to his labor, he goes with his mind pre-occupied with other subjects, which he feels must be mastered by an appointed hour. However interesting the work or illustration may be in itself, and however nearly related to the general course of study, it probably has no immediate connection with the indoor-lessons of the day, and consequently has been preceded by no special preparation for it.

The remedy for these drawbacks on the value of the practical instruction and work, seems to us to be, to put the farm and gardens, and stock and all other appurtenances of the labor system, into the hands of the Faculty as so much apparatus for the illustration of what they teach. Then the labor of students will be employed less for what they may accomplish than for what they may learn from it. It may oftener be made to illustrate the lessons of the day; if not, it will be under the supervision of those who can refer the pupil at once to page of text-book, or lecture, or class-room discussion; under one whose interest is alike alive to general principle and particular application, and who at stated and proper times can recall the out-of-door exercise to the notice of the class.

To many persons so lengthy a discussion of what would appear to be the obviously proper course, might seem to require an apology But it must be remembered that until two years ago the farm has been under management entirely independent of those who gave instruction in the several sciences, and that some persons still think that it is sufficient for all the uses of the farm, if it be put under the care of a skillful farmer, however much he may be ignorant of the principles on which his skill depends. Persons in other States also who are interested in the work of establishing agricultural colleges under the late land-grants of Congress, are entitled to whatever results our experience may seem to us to have wrought out.

Had the general plan now instituted been entered upon at an earlier day, perhaps the problem of what an Agricultural College should be, would have been decided, by the perfect working of our own. As it is, in spite of the partial success of the College in Pennsylvania, and of our own, every question is under discussion in other States: the length of the course; the kind of studies; whether on not instruction shall be given wholly by lectures; whether labor shall be required of the students; whether the farm is to be mainly a model or an experimental one; and the relations in general of labor and study. The details of our plans are eagerly sought for by persons in other States, and, as a general thing, are approved by those who give them their attention. The Commissioner of Agriculture, at Washington, has examined and endorsed our general plan. The prevalent discussion of agriculturl education in the papers, occasioned by the late grants of Congress, have not as yet brought to our notice any detailed plans varying much from the system we are already working upon. Intelligent farmers and educationists who have visited the College, express themselves pleased with the plan, and what they see of its workings. We would be glad to prosecute the work with such vigor as to enable Michigan to maintain the first rank for the excellence, as it does for the priority of its Agricultural College.

MILITARY.

At the last regular session of the Legislature a military school was established in connection with the Agriculture College, but no appropriation was made for its support. Although a few years yet remain before instruction in military tactics must be given in accordance with the terms of the Congressional grant of lands for the endowment of the College, yet such a beginning has been made as could be done without much additional expense. Arms and accoutrements were obtained from the Quartermaster General of the State, and a weekly drill maintained through a considerable portion of the year. A course of elementary lectures on military hygiene has been given, and another on field fortifications. A nmber of standard works on military art and related subjects have been purchased and added to the library of the College.

EXTENSION OF THE SCOPE OF INSTRUCTION.

The organic law of the College contemplates a wide range of instruction—nearly such as is laid down in the Course of Study. The field of labor designated in the law of Congress granting lands for the endowment of such colleges is perhaps still wider—the teaching of "such branches of learning as are related to agriculture and the mechanic arts," "without excluding scientific and the classical studies, and including military tactics." The design of both laws is to support schools which shall assist "all forms of industry which by handicraft and the use of machinery contribute to the sustenance and comfort of man." And this is to be done according to the law, as well as in accordance with sound philosophy, by teaching, not primarily how to do a certain work, but the *sciences* on which the practical operations depend. Consequently, at the College the same mechanics, the same doctrine of forces and equilibrium are taught, as underlying a knowledge of agricultural implements and their uses, that would be required in a school of engineering. To a certain extent industrial drawing, civil engineering, framing, carpentering, are also taught. Surveying and leveling are part of the course of study. So also, the geology and chemistry which would be essential to a school of mining, are taught in the College, as having most intimate relations to agriculture. In their applications to the arts of life, the sciences work hand in hand, and an investigation of the principles on which one art such as agriculture depends, will naturally lead to the scientific principles which are essential to others also. The natural enlargements of the College will therefore make way for instruction in the principles of all sciences upon which the material interests of the State largely depend.

But there are good reasons, as it seems to us, why no attempt should be made, at present to extend the sphere of the operations of the College much beyond what has hitherto been its aims; either by the addition of departments of a different nature here, by branch institutions, or by appropriations of a portion of the funds for the purpose of making experiments in other sections of the State.

In the first place, the work to be done within its own boundaries is but just begun. The best efforts of the officers, of all interested, and of the State itself, should be given to making the College as a unit and its limited undertaking to be perfectly successful, established in its workings and fruitful of acknowledged good to the State. The State has accepted the Congressional grant for the endowment of such a College, other States by like acceptance are awake to the subject of agricultural schools; the honor and interest of the State both require that we shall establish one institution in a sure prosperity before entering into other untried ways that prove always so costly and long in maturing.

Again, the money is not on hand with which to undertake more than is now contemplated. All that the State will willingly appropriate, will at most be but sufficient to make the farm and buildings such as the present needs of the Institution require.

The entire fund that can be realized from the sale of swamp-lands and the Congressional grant will be no large endowment for a College of this kind. It is doubtful whether the lands can be sold at a minimum of $2 50 per acre, as fixed by law. Should the 240,000 acres be sold at $1 25 per acre, and the fund draw interest at 5 per cent., which may not perhaps be remote from the result, the fund would grant the College a yearly income of only $15,000. It is not probable that the income will exceed $20,000 from all sources. The whole of this might be expended in a school for instruction in the mechanic arts, and still be insufficient. It would not support a first-class military school. The Congressional appropriation for the support of the United States Military Academy for 1865 is more than $200,000, of which but a small part can go to feed and clothe the students. The entire fund will but make a respectable school of agriculture, with its accompanying military department, where, in teaching the sciences on which these arts depend, the principles and various applications pertaining to other arts will naturally have place.

NUMBER OF STUDENTS.

The number of students has not been large, as the catalogue will show. They have enjoyed excellent health, have been unusually regular in attendance, and have manifested unusual interest in the more purely professional objects of the School. The number might have been largely increased at the middle of the term, had we been willing to create new classes of an academic nature. But the Faculty could not bring themselves to believe that the difference between sixty and one hundred students, was so important as the work of developing the professional character of the College, in accordance with the plans of operations, laid down in the Report of the Board for the year 1863, and of the document to be found on the 45th page appended to the same Report.

The war, and the consequent scarcity of labor, would naturally affect a College of this kind, more than it would most other Educational Intitutions. Medical Schools, on account of the great demands of the army, would find this to be their harvest time. Young men, aspiring to the professions of law and divinity, would, unless actually in the service of the Country, be found, as heretofore, in the professional school, or in the College, because that is *the only way to the positions* they seek. Young men of the cities and larger villages, who have means and leisure, will be found in the usual proportions in the Academies and Colleges, pursuing a course of general education, preparatory to the choice of vocations for life. But the farmer's son has no leisure, however ample his means; neither is an education indispensable to the usual measure of success in his business. The desire to possess an education peculiarly adapted to the farmer's life, is to be created; and to do that work, it is necessary that the College should possess superior means of illustration, in matters pertaining to the management of stock, and crops, and orchards, and the like; and that the Faculty should never be unmindful of the specific aims of the Institution, but should lead students by their own enthusiasm, and a familiarty with out-of-door affairs, to a like enthusiasm, and to the reference of all farming operations to the general principles of science.

T. C. ABBOT, *President.*

REPORT

OF EXPERIMENTS IN TOP-DRESSINGS APPLIED TO GRASS-LANDS AT THE STATE AGRICULTURAL COLLEGE FARM, 1864.

To the Faculty of the State Agricultural College:

The committee appointed to conduct certain experiments in the application of various top-dressings to grass-lands, would present the following report:

A piece of ground, 24 rods by 24, in the College Park, was selected for these experiments. This field was sown with oats, last year, without manure, and seeded with timothy and clover, the latter predominating in the growth of the present year. The piece of ground selected appeared to be of even fertility, and the growth of grass and clover prior to the application of any top-dressing was very uniform. The ground was divided into eight equal parts.

No. 1 had no top-dressing, serving as a basis of comparison, showing the natural productiveness of the soil.

No. 2 received a dressing of plaster at the rate of two bushels per acre.

No. 3, five bushels of wood ashes per acre.

No. 4, twenty loads of pulverized muck per acre.

No. 5, twenty loads of pulverized muck and three bushels of common salt per acre.

No. 6, three bushels of common salt per acre.

No. 7, twenty loads of horse-manure per acre.

No. 8, twenty loads of cow-manure per acre.

These dressings were applied from the 5th to the 10th of May.

The grass was cut June 20th and 21st by a "Buckeye Junior" machine, cured in small cocks, and drawn into the barn in good condition, June 25th. Each load being carefully weighed on Fairbanks' Hay-Scale.

The yield per acre of each piece, the kind of top-dressing employed, and the gain per acre, are given in the following table:

EXPERIMENTS IN GRASS.

	Yield per acre.	Gain per acre.	Gain per cent.	TOP-DRESSING APPLIED.
No. 1.	2,856	....	....	None.
No. 2.	3,917	1,061	37	Plaster.
No. 3.	4,515	1,659	57	Wood ashes.
No. 4.	4,566	1,710	59	Pulverized muck.
No. 5.	4,696	1,840	64	Pulverized muck and salt.
No. 6.	3,813	957	33	Common salt.
No. 7.	3,708	842	29	Horse-manure.
No. 8.	3,931	1,075	37½	Cow-manure.

The second crop of clover, &c., was cut by the same machine August 9th and 10th, was put up in small cocks August 10th and 11th. The cocks were turned August 12th, and drawn into the barn August 15th, each load being carefully weighed, as before.

The results are given in a tabular form, as in the first crop:

EXPERIMENTS IN GRASS.

	Yield per acre.	Gain per acre.	Gain per cent.	TOP-DRESSING APPLIED.
No. 1,	1,742	....	....	None.
No. 2.	3,056	1,314	75	Plaster.
No. 3.	2,977	1,235	71	Wood ashes.
No. 4.	3,306	1,564	89	Pulverized muck.
No. 5.	2,975	1,233	71	Pulverized muck and salt.
No. 6,	2,467	725	41½	Common salt.
No. 7.	2,678	936	54	Horse-manure.
No. 8.	2,856	1,114	64	Cow-manure.

These tabular results are given in a separate form instead of being combined in one result, from the conviction that they will give a more satisfactory impression in regard to the experiment.

In the experiments of 1863, in top-dressing grass-lands with muck and salt, muck alone gave a gain of 24¾ per cent., muck and salt gave a gain of 22 per cent., and salt alone 17 per cent.

These experiments have been undertaken for the purpose of calling the attention of farmers to the great value of the beds of muck which lie too often neglected and useless—a prolific source of discomfort and disease, instead of what they should be, wealth and abundance.

The experiments were purposely very simple in their character, in hopes that others would repeat them and give to the public the results. "Agricultural successes which are the result of simple, lavish expenditure, without reference to agricultural returns, are but empty triumphs; no success in any method of culture is thoroughly sound and praiseworthy, except it be imitable, to the extent of his means, by the smallest farmer."

All of which is respectfully submitted.

R. C. KEDZIE,
Chairman of Committee.

STATE AGRICULTURAL COLLEGE,
Lansing, Aug. 22, 1864.

TREASURER'S REPORT.

Treasurer of State Board of Agriculture in account with State Agricultural College.

DEBIT.

1863.		
Dec. 18.	To balance, cash on hand,............	$2,969 28
1864.		
April 30.	To cash, of State Treasurer,...........	1,000 00
June 30.	" "	2,000 00
Sept. 30.	" "	3,000 00
Nov. 18.	" "	4,000 00
Dec. 20.	" S. Howard, Sec'y, (by Pres. Abbott,).........................	1,582 51
		$14,551 79

CREDIT.

By paid warrant	No.	163, T. C. Abbot,...........	$150 00
"	"	173, "	90 00
"	"	126, P. Parsons,............	177 66
"	"	187, A. N. Prentis,..........	135 54
"	"	194, T. C. Abbot,...........	200 00
"	"	200, F. A. Stebbins,.........	120 86
"	"	201, S. S. Rockwell,.........	100 00
"	"	202, C. A. Kenaston,........	73 25
"	"	203, "	200 00
"	"	204, "	202 30
"	"	205, S. S. Rockwell,.........	125 00
"	"	207, R. C. Kedzie,..........	250 00
"	"	208, T. C. Abbot,...........	100 00
"	"	209, A. N. Prentiss,.........	133 94

By paid warrant	No.	211, M. Miles, ...	$218	50
“	“	212, S. S. Rockwell, ...	71	51
“	“	213, C. A. Noble, ...	60	55
“	“	215, S. S. Rockwell, ...	150	00
“	“	216, C. A. Kenaston, ...	241	50
“	“	218, M. Miles, ...	200	00
“	“	220, S. S. Rockwell, ...	100	00
“	“	222, “	300	00
“	“	223, M. Miles, ...	200	00
“	“	225, S. S. Rockwell, ...	150	00
“	“	226, “	100	00
“	“	227, M. Miles, ...	350	00
“	“	228, R. C. Kedzie, ...	118	00
“	“	229, S. S. Rockwell, ...	112	50
“	“	230, C. A. Noble, ...	100	00
“	“	231, R. C. Kedzie, ...	238	38
“	“	232, Oscar Clute, ...	60	00
“	“	233, A. N. Prentiss, ...	60	00
“	“	234, “	38	12
“	“	236, “	122	25
“	“	238, C. A. Kenaston, ...	86	82
“	“	240, T. C. Abbot, ...	50	00
“	“	241, M. Miles, ...	221	19
“	“	242, “	250	00
“	“	243, C. A. Kenaston, ...	310	00
“	“	244, M. Miles, ...	183	00
“	“	245, “	100	00
“	“	246, S. S. Rockwell, ...	175	00
“	“	247, C. A. Kenaston, ...	71	26
“	“	248, M. Miles, ...	80	00
“	“	249, C. A. Kenaston, ...	125	00
“	“	250, T. C. Abbot, ...	116	00
“	“	251, “	84	00
“	“	252, S. S. Rockwell, ...	300	00
“	“	253, S. Howard, ...	350	00

By paid warrant	No.	254, M. Miles,	$200	00
“	“	255, T. C. Abbot,	75	00
“	“	256, O. Clute,	100	00
“	“	257, S. S. Rockwell,	125	00
“	“	258, T. C. Abbot,	42	40
“	“	259, R. C. Kedzie,	250	00
“	“	260, S. S. Rockwell,	112	50
“	“	261, C. A. Noble,	100	00
“	“	262, Oscar Clute,	14	34
“	“	263, A. N. Prentiss,	114	27
“	“	264, S. Howard,	275	00
“	“	265, “	300	00
“	“	266, M. Miles,	247	51
“	“	267, A. N. Prentiss,	83	22
“	“	268, S. S. Rockwell,	100	00
“	“	269, Oscar Clute,	83	18
“	“	271, Manly Miles,	200	00
“	“	272, “	200	00
“	“	273, R. C. Kedzie,	250	00
“	“	274, T. C. Abbot,	75	00
“	“	275, S. S. Rockwell,	300	00
“	“	276, “	75	00
“	“	277, A. N. Prentiss,	100	00
“	“	278, “	30	75
“	“	279, “	129	53
“	“	280, S. S. Rockwell	100	00
“	“	206, T. C. Abbot,	200	00
“	“	210, Oscar Clute,	60	00
“	“	214, C. A. Kenaston,	133	87
“	“	217, Oscar Clute,	40	00
“	“	219, S. S. Rockwell,	440	00
“	“	221, “	75	00
“	“	224, T. C. Abbot,	109	68
“	“	235, A. N. Prentiss,	85	00
“	“	237, T. C. Abbot,	59	41

By paid warrant No.	239,	C. A. Kenaston, ...	$206 18
" "	270,	"	173 42
" "	281,	S. S. Rockwell, ...	100 00
" "	282,	T. C. Abbot, balance, ...	1,634 45
			$14,551 79

L. G. BERRY, *Treasurer.*

LANSING, December 30, 1864.

WARRANT STATEMENT of the Secretary of the State Agricultural College, for the year 1864.

Number.	1864.		To Whom Payable.	Object.	Amount.
200	Jan.	26	F. A. Stebbins, ...	Final Settlement, ...	$120 00
201	Feb.	4	S. S Rockwell, ...	Boarding Hall, ...	100 00
202	"	14	C. A. Kenaston, ...	Board Expenses, ...	73 25
203	"	14	C. A. Kenaston, ...	Boarding Hall, ...	200 00
204	"	22	John A. Kerr & Co., ...	Printing, ...	207 30
205	Mar.	3	S S. Rockwell, ...	Boarding Hall, ...	125 00
206	"	5	T. C. Abbot, ...	Salary, ...	200 00
207	April	1	R. C. Kedzie, ...	Salary, ...	250 00
208	"	1	T. C Abbot, ...	Salary, ...	100 00
209	"	1	A N. Prentiss, ...	Salary, ...	183 94
210	"	1	Oscar Clute, ...	Salary, ...	60 00
211	"	1	M. Miles, ...	Salary, ...	218 50
212	"	1	S. S Rockwell	Salary, ...	71 51
213	"	1	C. A. Noble, ...	Salary, ...	60 55
214	"	1	C. A. Kenaston, ...	Salary, ...	138 87
215	"	14	S S. Rockwell, ...	Boarding Hall, ...	150 00
216	"	27	C. A. Kenaston, ...	Silliman's Journal, ...	241 50
217	May	5	Oscar Clute, ...	Salary, ...	40 00
218	"	6	M. Miles, ...	Farm, ...	200 00
219	"	7	S. S. Rockwell, ...	Boarding Hall, ...	440 00
220	"	7	S. S. Rockwell, ...	Boarding Hall, ...	100 00
221	"	14	S. S. Rockwell, ...	Boarding Hall, ...	75 00
222	"	26	S. S. Rockwell, ...	Boarding Hall, ...	300 00
[illegible]	"	26	M. Miles, ...	Lumber, ...	200 00
[illegible]	June	3	T. C. Abbot, ...	Salary, ...	200 00
[illegible]	"	25	S. S. Rockwell, ...	Boarding Hall, ...	150 00
[illegible]	"	28	S. S. Rockwell, ...	Boarding Hall, ...	100 00
[illegible]	"	24	M. Miles, ...	Shed, ...	250 00
[illegible]	"	28	R. C. Kedzie, ...	Chemicals, ...	118 00

STATEMENT—Continued.

Number.	1863.		To Whom Payable.	Object.	Amount.
229	July	1	S. S. Rockwell,	Salary,	$112 50
230	"	1	C. A. Noble,	Salary,	100 00
231	"	1	R. C Kedzie,	Salary,	233 33
232	"	1	Oscar Clute,	Salary,	60 00
233	"	1	A. N. Prentiss,	Garden,	60 00
234	"	1	A. N. Prentiss,	Garden,	38 12
235	"	1	A. N. Prentiss,	Garden,	35 00
236	"	1	A. N. Prentiss,	Salary,	122 25
237	"	1	T. C. Abbot,	Salary,	89 41
238	"	1	C. A. Kenaston,	To pay bills,	86 82
239	"	1	C. A. Kenaston,	Salary,	266 13
240	"	1	T. C. Abbot,	Secretary's office,	50 00
241	"	1	M. Miles,	Salary,	221 19
242	"	1	M. Miles,	Farm,	240 00
243	"	19	C. A. Kenaston,	Library, &c.,	310 00
244	Aug.	1	M. Miles,	Sheep,	143 00
245	"	1	M. Miles,	Shed,	100 00
246	"	6	S. S Rockwell,	Boarding Hall,	175 00
247	"	19	C. A. Kenaston,	Painting, &c.,	71 23
248	"	27	M. Miles,	Farm,	80 00
249	"	31	C. A. Kenaston,	To pay bills,	125 00
250	Sept.	1	T. C. Abbot,	Salary,	116 00
251	"	1	T. C. Abbot,	Salary,	84 00
252	"	1	S. S. Rockwell,	Boarding Hall,	300 00
253	"	1	Sanford Howard,	Office, &c.,	353 00
254	"	1	M. Miles,	Farm,	200 00
255	"	14	T. C. Abbot,	Salary,	96 00
256	"	14	O. Clute,	Salary,	100 00
257	"	14	S. S. Rockwell,	Boarding Hall,	125 00
258	Oct.	1	T. C. Abbot,	Salary,	42 00
259	"	1	R. C. Kedzie,	Salary,	250 00
260	"	1	S. S. Rockwell,	Salary,	112 50
261	"	1	C. A. Noble,	Salary,	100 00
262	"	1	Oscar Clute,	Salary,	18 [illegible]

STATEMENT—Continued.

Number.	1864.		To Whom Payable.	Object.	Amount.
263	Oct.	1	A. N. Prentiss,	Salary,	$114 27
264	"	1	Sanford Howard,	Salary, &c.,	275 00
265	"	1	Sanford Howard,	Ayrshires	300 00
266	"	1	M. Miles,	Salary,	247 51
267	"	10	A. N. Prentiss,	Garden,	83 22
268	"	11	S. S. Rockwell,	Boarding Hall,	100 00
269	"	15	Oscar Clute,	Books,	83 18
270	"	1	C. A. Kenaston,	Salary,	173 42
271	Nov.	18	M. Miles,	Farm,	200 00
272	"	18	M. Miles,	Farm,	200 00
273	"	18	R. C. Kedzie,	Salary,	250 00
274	"	18	T. C. Abbot,	Secretary's Office,	75 00
275	"	18	S. S. Rockwell,	Boarding Hall,	300 00
276	"	18	S. S. Rockwell,	Salary,	75 00
277	"	18	A. N. Prentiss,	Garden,	100 00
278	"	18	A. N. Prentiss,	Salary,	30 75
279	"	18	A. N. Prentiss,	Prof. Clute's Salary,	129 53
280	"	18	S. S. Rockwell,	Boarding Hall,	100 00
281	Dec.	12	S. S. Rockwell,	Boarding Hall,	100 00
282	....		T. C. Abbot,	Use of College,	1,634 45
Total,					$13,798 50

SANFORD HOWARD,
Secretary.

APPENDIX.

THE AGRICULTURAL LAND-GRANT.

To the Legislature of the State of Michigan:

The law organizing the Agricultural Land-Grant Board does not require a report of their proceedings; but, in compliance with what it is believed will be a general wish, submit the following report of the agent appointed by the Board, for the selection of the lands inuring to the State by virtue of the act of Congress, approved July 2d, 1862, as the report of the Board, and append the same to the Report of the Commissioner of the State Land Office, as the most appropriate place.

All of which is respectfully submitted.

JAMES B. PORTER,
Secretary Agricultural Land-Grant Board.

To His Excellency Austin Blair,
Governor and Chairman of the
Agricultural Land-Grant Board:

Sir—I have the honor to submit my report, as agent of the Board, for the selection of the lands granted the State, by act of Congress, approved July 2d, 1862, for the endowment of Colleges for the benefit of Agriculture and the Mechanic Arts. The preliminary steps, such as procuring lists and maps from the United States District Offices, showing the unsold government lands, necessarily occupied some time.

Acting under the advice of the Board, recourse was had to the history of the lands subject to entry, and the topography of each particular quarter section, as found in the papers relating to the original survey of the lands in question, and the maps, plats and remarks of the surveyors, in the State Land

Office. This, together with such information as could be obtained by correspondence, with parties familiar with different localities, has been the chief means made use of in the selections already made.

The lands, thus far, have been selected with reference to their intrinsic value, and early availability for the purposes of the grant, and have consequently been made adjacent to the settled portions of the State, and within reach of some of the most important lines of State roads now in process of construction.

The law of Congress imposes two conditions in regard to locating the lands granted, which have imposed much care and labor, as well as much more extensive examinations, than would otherwise have been necessary, as they greatly abridge the quantity of government lands most desirable in location and availability.

The first relates to the selection of lands of the *double minimum price*, which is permitted, "provided they shall be computed to the States at the maximum price, and the number of acres proportionally diminished. This affects large tracts of land adjacent to the lands reserved for railroad and other purposes. None such have been selected.

The second restricts selections to quantities "not less than one quarter section," "which is not construed as forbidding the selection of a legal subdivision less than a quarter section, but every such selection must be charged to the State as a quarter section, or 160 acres."

Could selections have been made of quantities less than a quarter section, or of adjoining eighty acre tracts, upon different sections or different quarters of the same section, the labor would have been much less, and the land more uniform in quality.

The selections thus far have been of farming lands in the Counties of Alpena, Antrim, Bay, Benzie, Cheboygan, Clare, Emmet, Grand Traverse, Isabella, Kalcaska, Leelanaw, Manistee, Mason, Missaukee, Newaygo, Oceana, Osceola, Otsego and

Wexford. They are located chiefly south of the line of the Flint and Pere Marquette, and west of the Indiana and Grand Rapids railroad routes, with an idea to secure lands adjacent to the settled portions of the State.

In the months of March, April and May, I filed with the Registers of the following District Land Offices lists as follows, to wit:

In the Ionia District, for	12,319.44
" Detroit District, for	20,491.58
" Traverse City District, for	116,191.69
" Saginaw District, for	444.89
Making the aggregate of	149,447.60

None of the above lands have, as yet, been confirmed to the State.

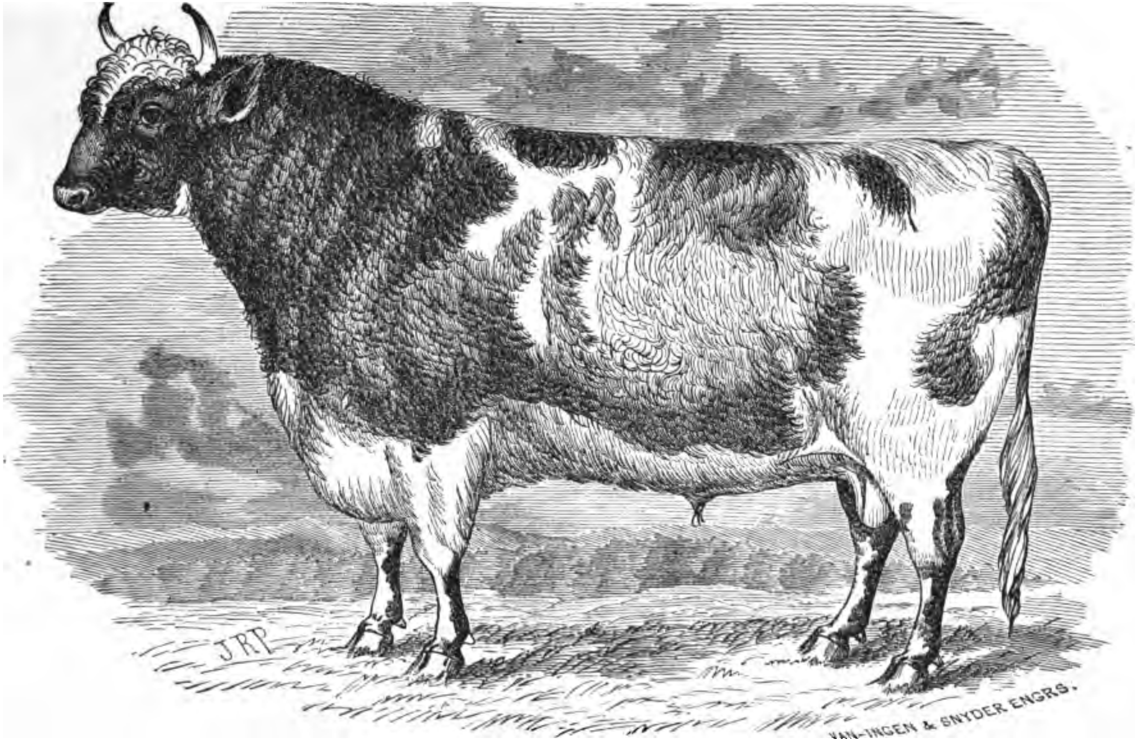
Some of the preliminary steps have been taken to locate the remainder due by the terms of this grant, which amounts to about 90,000 acres.

The expenses thus far attending the selections have been comparatively light—less than six hundred dollars—a detailed statement of which is herewith submitted.

All of which is respectfully submitted.

SAMUEL S. LACEY,

Agent.



HAROLD.

Ayrshire Bull, four years old, bred in Scotland; formerly owned by **Henry H. Peters**, of Southborough, Mass.

CHARACTERISTICS OF AYRSHIRE CATTLE.*

BY SANFORD HOWARD,
SECRETARY OF THE MICHIGAN STATE BOARD OF AGRICULTURE.

The leading cattle-breeders of Britain have of late years, for the most part, aimed to establish in their stock some particular property in a high degree—beef or milk, according to circumstances, being the leading object. Hence it has occurred that British cattle have latterly been classed under the heads of "beef breeds" and "milk breeds." Prominent among the latter is the Ayrshire breed, which originated in the county of Ayr, Scotland, and within the last fifty years has been disseminated over every part of that country where dairying is much practiced.

The breed has also been established in the north of Ireland, forming in several counties the leading stock. A great number of the cows are annually taken into various districts of England, while in several countries of continental Europe the breed has been introduced, and is propagated with care.

It has also been introduced into the United States and the British provinces of North America, and, at the present time, is probably more extensively kept as a dairy breed than any other in the world.

Importations of Ayrshire cattle into this country were made upwards of twenty years ago, but the animals were neither numerous nor generally in the hands of persons who took much pains to increase them. It was not, therefore, until a comparatively late day that the Ayrshires were much known here, or that specimens were sufficiently numerous to indicate the permanent establishment of the breed in this country.

---

*From the Report of the Commissioner of Agriculture for 1863.

A few remarks in regard to the origin of this valuable breed of cattle, in connection with their comparative value for dairy purposes, may not be out of place.

It is evident that the modern Ayrshire breed presents a wide contrast to that which occupied the western portion of Scotland many years ago.

Aiton, in his "Dairy Husbandry," speaks of the cattle which occupied Ayrshire fifty years before the time when he wrote (1806) as follows: "The cows kept in the districts of Kyle and Cunningham (districts of Ayrshire) were of a diminutive size, ill-fed, ill-shaped, and yielded but a scanty return in milk; they were mostly of a black color, with stripes of white along the chine or ridge of their backs, about their flanks, and on their faces; their horns were high and crooked; their pile [hair] was coarse and open, and few of them yielded more than three or four Scotch pints [six to eight wine quarts] of milk a day."

A comparison of these points with those presented by the present breed of Ayrshire cattle renders probable the conclusion of Youatt, that the present stock could not have arisen entirely from the old. It follows, therefore, that the modern breed, like various other valuable breeds of domestic animals, originated in crossing. The question as to the breeds from which it was derived will be briefly considered.

Various accounts represent that the Earl of Marchmont, some time between 1724 and 1740, introduced to his estates in Berwickshire some cattle, conjectured (their history was not positively known) to be of the Holderness or Teeswater breed, and that not long afterwards some of the stock was carried to estates belonging to the same nobleman in that part of Ayrshire called Kyle.

But it is not improbable that the chief nucleus of the improved breed was the "Dunlop stock," so-called, which appears to have been possessed by a distinguished family by the name of Dunlop, in the Cunningham district of Ayrshire, as early as 1780. This stock was derived, at least in part, from animals imported from Holland.

The Dunlop cows soon became noted. Rawlin, (as quoted by Youatt,) who wrote in 1794, speaking of the cattle of Ayrshire, says: "They have another breed, called the Dunlop, which are allowed to be the best race for yielding milk in Great Britain or Ireland, not only for large quantities, but also for richness and quality." This, though perhaps extravagant praise, shows that the stock possessed remarkable properties at that early day. It was, indeed, held in great esteem still earlier. In Youatt's "Treatise" it is mentioned, when speaking of the cattle of Dumfriesshire, that the poet Burns, when he occupied a farm near the city of Dumfries, not content with the Galloway breed, introduced some of the west country cows, which he thought would produce more milk. In the poet's published correspondence allusion is made, in a letter dated November 13, 1788, to a heifer which had been presented to him by the proprietor of Dunlop House, as "the finest quey in Ayrshire." Mrs. Dunlop, it will be recollected, was a special friend and correspondent of the poet.

As a further explanation of the preference given by Burns for the "west country cows," it may be mentioned that the writer, when visiting Scotland for the purchase of Ayrshire cattle in the year 1858, had several interviews with the poet's sister, the late Mrs. Begg, of Ayr, in one of which she stated that her brother, during his occupancy of the farm of Ellisland, near Dumfries, "kept a dairy and made considerable of cheese." His efforts to procure the Ayrshire cows show that they had, even at that time, a high reputation for this object. Colonel Le Couteur, in a paper on the Jersey or Alderney cow, published in the Journal of the Royal Agricultural Society of England, refers to a statement by Quayle, that the Ayrshire was a cross of the Short-horn and Alderney, and adds, himself, that "there is considerable affinity between the two breeds"—meaning the Ayrshire and Alderney.

Rawlin also says, in reference to the Ayrshire breed: "It is said to be a mixture by bulls brought from the Island of Alderney with their own, or the old race of cows."

Martin says: "At some period or other there has evidently been a cross with the Durham or Holderness, and perhaps, also, with the Alderney breed."

Professor Low, in his "Illustrations of British Quadrupeds," says: "From all the evidence of which, in the absence of authentic documents, the case admits, the dairy breed of Ayrshire owes the characteristics which distinguish it from the older race, to a mixture of the blood of the races of the continent, and of the dairy breed of Alderney."

In addition to the foregoing evidence respecting the origin of the Ayrshire cattle, it should be stated that the present leading type of the breed was formed in part by an infusion of the blood of the Kyloe or West Highland breed. This appeared in the first instance, probably, in what has been called the Swinley variety.

The facts, as authentically obtained by myself in Scotland, on this point, are substantially as follows: Theophilus Parton, of Swinley farm, near Dalry, Ayrshire, about forty-five years ago, took great pains to establish a herd of what were deemed the best Ayrshire cattle, into which he infused a strain of the West Highland blood, the particular degree of which is not publicly or generally known. The Swinley stock differs from the older Ayrshire in having a shorter head, with more breadth across the eyes, more upright and spreading horns, more hair, and that of a more mossy character, and generally better constitutions. They are also somewhat smaller boned than the old stock, though from their superior symmetry and greater tendency to fatten they are fully equal to the former in weight of carcass when slaughtered.

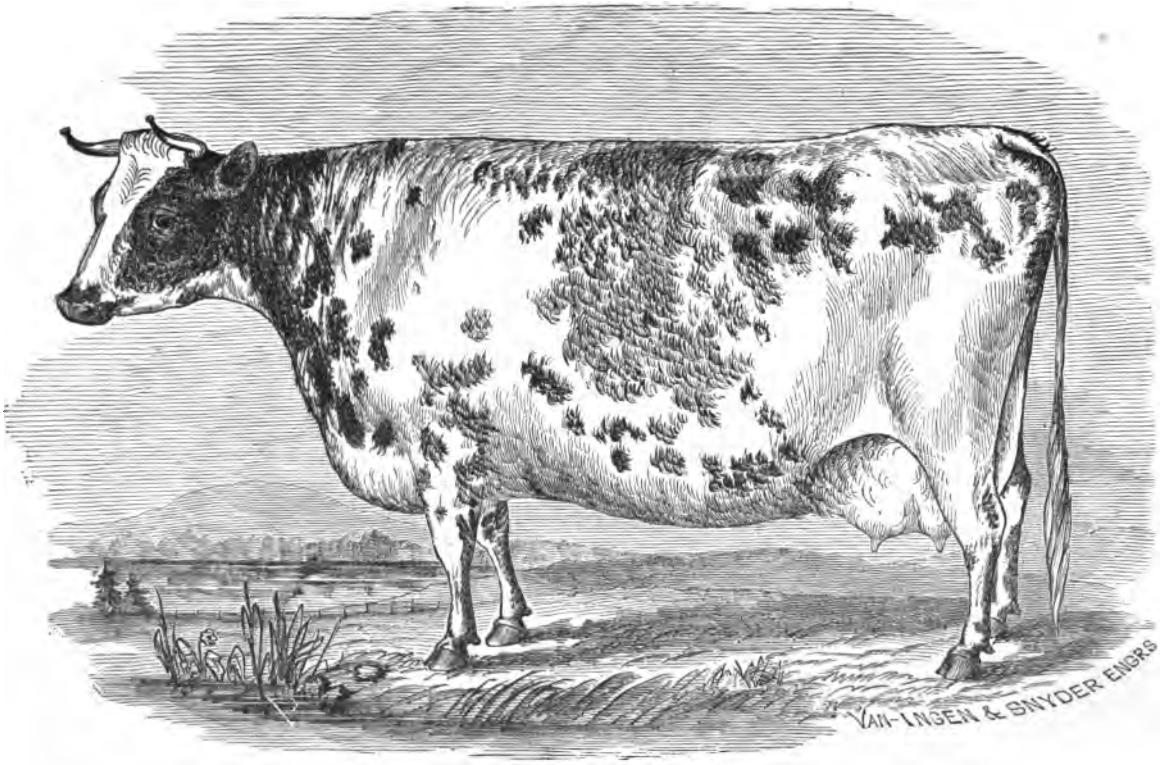
The following points given by the Ayrshire Agricultural Association in 1853, "as indicating superior quality," will give an idea of the standard of Ayrshire cattle as recognized by the leading breeders: Head short; forehead wide; nose fine, between the muzzle and the eyes; muzzle moderately large; eyes full and lively; horns widely set on, inclining upwards, and curving slightly inwards; neck long and straight from the head to the top of the shoulders, free from loose skin on the underside, fine at its junction with the head, and the muscles symmetrically enlarging towards the shoulders; shoulders thin at the top; brisket light; the whole fore-quarter thin in front, and gradually increasing in depth and width backwards; back short and straight; spine well defined, especially at the shoulders; short ribs arched; the body deep at the flanks; and the milk-veins well developed; pelvis long, broad and straight; hook (or hip) bones wide apart, and not much overlaid with fat; thighs deep and broad; tail long and slender, and set on a level with the back; milk-vessel (udder) capacious, and extending well forward; hinder-part broad, and firmly attached to the body; the sole or under surface nearly level; the teats from two to two and a half inches in length, equal in thickness, and hanging perpendicularly; their distance apart at the sides should be equal to about one-third the length of the vessel, and across to about one-half of the breadth; legs short, the bones fine, and the joints firm; skin soft and elastic, and covered with soft, close and woolly hair; the colors preferred are brown, or brown and white, the colors being distinctly defined; weight of the animal when fattened about forty imperial stones (that is 560 pounds), sinking the offal.

As to the annual returns of Ayrshire cows in dairy produce, Professor Low says: "Healthy cows in good pastures give 800 to 900 gallons of milk in a year." Aiton says "600 gallons a year may be deemed about an average of this breed." And the author of "British Husbandry" says, in reference to this yield: "If equaled, we believe it will not be found excelled by any other breed in the kingdom." Martin says: "The milk of a good Ayrshire cow will afford 250 pounds of butter, or 500 pounds of cheese annually." Milburn's estimate is, that cows of this breed will give from 600 to 800 gallons of milk in the course of the year, and as much as 260 pounds of butter. Haxton cites many statistics, from which it appears that in one dairy of thirty cows the average annual yield of milk was 632 gallons; that 9¼ quarts afforded a pound of butter, amounting to an aggregate of 274 pounds in a year. He adds: "From these data, it appears that the milk of the Ayrshire breed of cows is not only abundant in quantity, but also rich in those substances which constitute excellence of quality, and when with these qualities is considered the small amount of food consumed, the result is so favorable to this breed that few thoroughly acquainted with the subject, will refuse to rank the Ayrshire cow among the most valuable for dairy purposes in the United Kingdom."

In the competition at Ayr in 1861, for a prize offered by the Duke of Athol, the average weight of milk per day, for two days, from six cows, was about 50 pounds each, the cows being milked twice a day. The cow which took the first prize gave an average of 57 pounds per day. On this occasion, the Duke of Athol stated that the cow (then in his possession) which received the first prize of the previous year had given an average of upwards of twelve quarts of milk per day for a year, actual measurement having shown a product of 1,110½ gallons in something less than twelve months.

Comparatively few accurate trials have been made with specimens of the breed in this country. One of four imported Ayrshire cows, owned several years since by the late J. P. Cushing, of Watertown, now Belmont, Massachusetts, gave in one year 3,864 quarts of milk, beer measure. One of the cows, imported by the Massachusetts Society for Promoting Agriculture, in 1837, while kept by the late E. Phinney, Esq., of Lexington, Massachusetss, was said to to have afforded sixteen pounds of butter per week, for several weeks in succession. The imported cow, Jean Armour, owned by H. H. Peters, of Southboro', Massachusetts, in 1862, gave an average of 49 pounds of milk a day for 114 days, commencing June 1st; and for the month of July her average was 51 pounds 13 ounces per day. Her milk for three days in July yielded six pounds of butter. Her live weight at the close of the trial was 967 pounds.

It will be understood, from what has already been said, that the dairy is the leading object with the breeders of Ayrshire



MISS MILLER.

Ayrshire Cow, eight years old; imported by HENRY H. PETERS, of Southborough, Mass.

cattle. At the same time the important fact has not been overlooked, that to breed and perpetuate a profitable dairy stock regard must be had to hardiness and strength of constitution, and also to such fattening tendencies as will insure a profitable return from calves fattened for veal, from steers reared for beef, and from cows, which, having served their turn in the dairy, are at last dried of their milk and prepared for the shambles.

The importance of these properties is not sufficiently regarded by keepers of dairy stock in this country. Even if milk were the sole object, it would be impossible to preserve a breed possessing superior qualities in this respect, without giving attention to those points of form which denote strength of constitution. It has been well observed by Magne that "in the breeding of dairy stock we should make choice only of animals possessing the *two-fold character* of general vigor and activity of the mammary system."

These principles have been followed to a considerable extent by the leading breeders of Ayrshires, in Scotland. Hence they claim a high rank for the breed in reference to general usefulness. Aiton, in speaking of what the Ayrshire cow will do, says: "She yields much milk, and that of an oily or butyraceous, or caseous nature, and after she has yielded very large quantities of milk for several years, she shall be as valuable for beef as any other breed of cows known; her fat shall be much more mixed through the flesh, and she shall fatten faster than any other."

Whatever may be said in regard to the extent of these claims, it will be admitted that they indicate the confidence which was long ago placed in the breed in regard to the properties mentioned.

Youatt, who wrote twenty-five years after Aiton, says: "The breed has been much improved since Mr. Aiton described it." It is upwards of thirty years since Mr. Youatt made this remark, and in this time the breed has been still further improved in reference to general usefulness.

It is the unanimous testimony of the most experienced breeders in Scotland, that while nothing has been lost on the score of dairy properties, considerable has been gained in hardiness and thrift, and in the faculty of giving a greater return, both in milk and flesh, for the food consumed.

The common course in Scotland with calves of the Ayrshire breed that are not wanted for keeping up the dairy stock, is to fatten them for veal, or turn them for beef at an early age. The larger number, perhaps, of the males are killed for veal. In some districts the fattening of calves is an object of considerable importance, and the superiority of Ayrshire cows for producing the best quality of veal is acknowledged. Thus Haxton observes: "For all medium soils and climates throughout the United Kingdom, there is no breed equal to the Ayrshire for profit, whether the produce is converted into cheese, butter, or veal. Scotch farmers, who are in the practice of fattening stock of various breeds, state that Ayrshire steers at the age of three to three and a half years fatten to as much profit as any, reaching the weight of 700 to 800 pounds, the four quarters, and affording beef excelled in quality only by the West Highlanders and Galloways. The cow Ada, imported and owned by H. H. Peters, of Southboro', Massachusetts, was slaughtered about the first of April, 1863. Her dressed weight was as follows: beef, 882 pounds; tallow, 111 pounds; hide, 70 pounds; making a total of 1,009 pounds. The quality of the beef was pronounced by all who tried it superior to any they had before tasted, being high flavored, fine grained, and well *marbled*. This cow was seven years old.

In a work by the noted veterinarian, John Gamgee,* an extract is given from a letter of the well-known agriculturist Peter Maclugan, in which, speaking of the degree to which fattening and milking may be combined in the same breed, Mr. M. says: "I may add that nothing will fatten faster than well-bred Ayrshire queys [heifers]. I have known them prove more profitable than Short-horn queys, as feeders—that is, they fed as rapidly, and consumed less food than the latter; in fact, produced a stone of beef *cheaper* than the Short-horns did. The food was turnips, straw, and a little linseed cake."

---

* Dairy Stock: its selection, diseases, and produce. By John Gamgee. Edinburgh: Thomas C. Jack, 1861.

Few trials have yet been made with the Ayrshires in reference to fattening in this country, as most of the males have been kept for bulls, and the females have seldom been turned for beef till too far advanced in years to breed. As they become more numerous, however, the males will be more frequently castrated, and their value for beef, and also for labor, will be ascertained. Some breeders of the stock are now rearing steers, with the intention of working them in the yoke. There is no reason why Ayrshire oxen should not be equal to any of their size for labor. They are about the size of Devons, have clean, strong legs, well-placed muscles, and are generally very quick walkers.

Among the earlier importations of Ayrshires into this country were those of the "Massachusetts Society for Promoting Agriculture," about 1835 or 1836. A bull imported at this time was kept for one season or more in the neighborhood of Pittsfield, Massachusetts. Mr. C. N. Bement, who then had a farm in the vicinity of Albany, New York, and was breeding Short-horns, sent some cows of the latter breed to the Ayrshire bull alluded to, and reared several cows of this cross, with which he was so well pleased that he afterwards imported or obtained some full-blood Ayrshires, which he kept and bred from for several years, finally disposing of the stock to E. P. Prentice, of Albany, New York.

In 1844 the "Massachusetts Society for Promoting Agriculture" made another and larger importation of Ayrshires, and in 1858 they imported ten heifers and four bulls. These were subsequently sold by auction, with their progeny, and served to disseminate the blood very generally through Massachusetts. The late J. P. Cushing, of Watertown, Massachusetts, imported several Ayrshire cows and a bull about 1838. Near this time the late Captain Randall, of New Bedford, Massachusetts, commenced his importations, of which he made several previous to

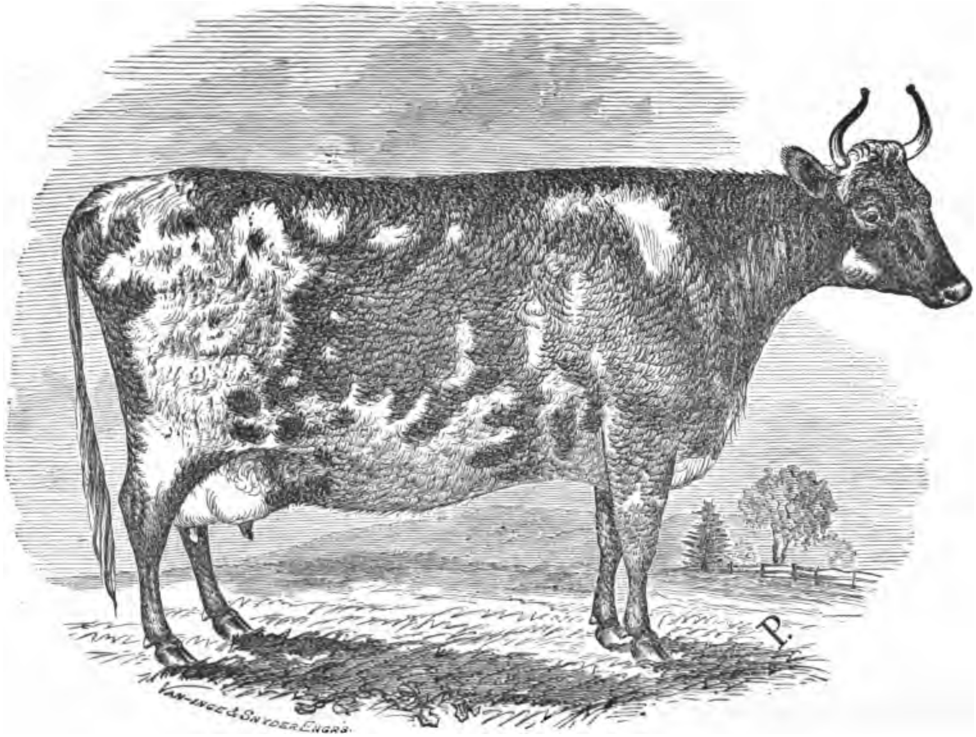
1844. Hon. Daniel Webster, also, imported some Ayrshires about 1840.

Mr. Ward, of Lenox, Massachusetts, imported several animals of this breed about 1840 to 1842, some of which were very fine specimens of the so-called Swinley family. These subsequently passed into the hands of Mr. Prentice, of Albany, New York, as did also a portion of the herd of Captain Randall; the best portion of Mr. Prentice's herd was purchased a few years since by William Birnie, of Springfield, Massachusetts. The late R. L. Colt, of New Jersey, Mr. Watson, of New York city, and others of that city and neighborhood, made various importations from 1844 to 1855, and perhaps later. The first importation of the fine stock known as that of Hungerford, Brodie & Co., Brodie & Campbell, &c., of Jefferson county, New York, was made in 1853.

H. H. Peters, of Southboro', Massachusetts, made his first importation of Ayrshires, consisting of four heifers, in 1858; a further importation of twenty-one females and two males was made in 1859. All these, as well as those imported by the Massachusetts Society for Promoting Agriculture in 1858, were selected in Scotland by the writer of this article. This herd now numbers ninety animals, and is the largest of this breed in the country. Mr. Peters has bred with great care and judgment, of which his splendid herd is a full testimonial.

The prominent position which the Ayrshires are taking, particularly as dairy stock, is indicated by the fact that a Herd-Book for the breed was issued in 1863, under the auspices of the "Association of Breeders of Thorough-bred Neat Stock," (Henry A. Dyer, of Brooklyn, Connecticut, Secretary,) in which are recorded the pedigrees of seventy-nine males and two hundred and seventeen females, nearly all owned in New England. It is much desired that breeders from other sections of the country should send their stock for record.

[It is proper to add, that Mr. Peters' herd was sold by public auction, April 11th, 1865.—SECRETARY.]



MISS DREW 2D.

Ayrshire Cow, four years old; bred by HENRY H. PETERS, of Southborough, Mass.

DRILL AND BROADCAST SOWING OF WHEAT.

A question of no little importance in wheat-culture, is the comparative advantage of drill and broadcast sowing. In reply to a question on this point, embodied in the circular issued by the Secretary, various answers, as shown by the Report, were received. As comprising further evidence on this subject, the following article from the Bi-Monthly Report of the Department of Agriculture for September and October, 1864, is here inserted. It embraces, as will be seen, statements from various parts of the country:

ILLINOIS.

Perry County.—"The damage to drilled wheat is *one-tenth* less this year than it commonly is. The damage to that sown broadcast is *two-tenths* greater than it has commonly been. The damage to broadcast sown by freezing out is commonly two or three times as great as it is to the drilled."

Winnebago County.—"The portions of winter wheat remaining under the fences look as well as an average. The crop as a whole is almost a total failure, probably less than one-tenth of what was reasonably anticipated last fall. There appears to be no difference between broadcast sowing and drilling; it is all killed alike."

Bond County.—"Of wheat there will be about two-thirds of a crop. Drilled is far superior to the broadcast."

Ogle County.—"Winter wheat is a failure, except where the heavy snow-drifts lay most of the time. Experience shows conclusively that the drill is the only mode of successfully growing winter wheat in this county."

DeKalb County.—"Winter wheat lately doing well; broadcast injured most, and drilled least."

Menard County.—"Last winter fully demonstrated the superiority of drilled over broadcast sowing in Illinois soil for winter wheat."

St. Clair County.—"In relation to the advantage of planting wheat with drills, it is considered so important by our farmers in this county that you scarcely see a field of wheat sown broadcast. Last winter was so severe upon the broadcast that I do not believe a single farmer will attempt to sow wheat broadcast this fall."

McDonough County.—"As to the relative merits of sowing wheat broadcast or by drill, all I can say is that drilling has gone out of vogue very nearly in the last three years. We used to drill a good deal of our wheat, but of late drills are seldom seen, by which I infer that drilling has not been regarded with much favor."

Jersey County.—"It is only when stumps or corn-stubs are in the way that broadcast sowing is resorted to. Some of our best farmers harrow after the drill, some roll before and after, but the surest way is to have the ground rough enough to mellow down with the frost. I have tried all ways. One year I sowed half a bushel per acre, and harrowed after the drill, and reaped forty bushels per acre. Last year I rolled some after the drill, mashing all the ridges down; it made the poorest wheat I had. The ground alongside, not rolled after, but before the drill, made double the wheat. The theory amongst our farmers is to make the ground solid, leave the drill-ridges to stand, and sow from the 15th to 25th of September."

"As to broadcast and drill sowing for wheat which you speak of, the former is by far the most successful; but to do neither is the most profitable in central Illinois, where twelve bushels of wheat are above the average yield per acre."

INDIANA.

Ripley County.—"The wheat was very much winter-killed, but the warm wet weather has revived it very much; and as regards the difference in drilled wheat and that sown broadcast as to winter-killing, there has not been much drilled in this county, but it shows the superiority of drilling."

Allen County.—"In regard to the difference in winter wheat drilled in or sown broadcast, it is largely in favor of the drilling where the ground is properly prepared. It should be thoroughly pulverized, either by harrowing or rolling, or both if necessary. When the ground is rough and cloddy, it is the experience of our farmers that wheat does better sown broadcast. Few of our farmers in this vicinity realize the great advantages to be derived from the thorough preparation of the soil before planting. To the majority of them under-draining, subsoiling, rolling, and a regular system of cropping and manuring, are subjects that receive no attention in preparing for seeding, and the result is always too plainly manifested in short and inferior crops at harvest."

Parke County.—"There is more difference this season than ever before between wheat sown with the drill and broadcast. The drilled is decidedly the best; it will yield one-third more to the acre than the broadcast."

Howard County.—"Our wheat crops are better than ever known since our county has been settled. Drilled wheat is the best, and in the coming year there will be little, if any, sown broadcast."

Huntington County.—"In my report for April and May I felt authorized to say, in reference to wheat sown by drill and broadcast, that that sown by the drill was not apparently injured, while that sown by the other method was seriously. Since that time quite an improvement was made in the appearance of that sown broadcast, and, had we not suffered so severely from drought, our crop would have been above an average. One of our most careful and judicious farmers states that while his drilled wheat seemed to stand the winter better than that sown broadcast, still at harvest this last was the best in every particular. *His broadcast did not suffer much from freezing.* So, too, some others of our observing farmers hold the opinion that if as much care be taken in the preparation of the soil for broadcast sowing as *must* be done for the drill, there would be no advantage in drilling; perhaps the advantage would be the other way."

Whitney County.—"We suppose wheat much better drilled than sown broadcast, and I am inclined to the opinion that it is best to have it drilled north and south, as our winds mostly come from the west It saves the snow from being blown away from the roots of the wheat, and the whole field will not sweep as clean of snow as where the drilling is east and west."

Henry County.—"Harvesting of the wheat crop has still further shown the advantages of drill over broadcast sowing. I think the difference may be estimated at the lowest at *one-tenth* in favor of drilling. *Early*-sowed wheat is much the best, say *one* to *two*-tenths."

OHIO.

Marion County.—"Although on the subject of drilled and broadcast sown winter wheat, I have made considerable inquiry, I have hesitated to make a positive statement. I found on one farm near town that 10 acres were sown broadcast by one person, and 12 acres were drilled in by another, and there was no appreciable difference in the character of the soil—that is, there was about the same proportion of black and clay soil. Now upon the 12 acres of drilled wheat there is three times as much standing in good condition as upon the 10 acres. Going about half a mile further east I found a field of, say 30 acres of wheat, which had been drilled in, but which was such an utter failure that oats have been drilled in upon the field this spring. This field was of a cold, wet, clay soil, perhaps as unfavorable for wheat as could be selected. Another farmer stated that after a crop of flax he had suffered a field to lie in fallow last summer, and in the fall ploughed a part of it; finding it very mellow, he put in his wheat by drill, both that which he had ploughed and that which he had not. This spring it is in excellent condition, all parts being about the same. He had sown the same field in wheat several times before, and on a certain portion of it (perhaps somewhat wet) he had never before raised any wheat, but this year (drilled in) there is no appreciable difference in the whole. I have asked the question of a great number of farmers as to the comparative value of drilled and sown wheat, and the almost uniform answer is in favor of the former—1st, because it is evenly sown; 2d, because it is a protection against the effects of frost. Many, indeed, say they cannot prove this by their own experience, and yet they are decided in their own opinion; only one farmer I met with said he had tried both, and was positively in favor of sowing broadcast, even having in view the effects of the frost."

Two months after, this excellent correspondent thus writes: "The crop of winter wheat last year was very deficient, and consequently, although that of this year was seriously injured, it was still better than then former. Continued inquiries respecting the comparative value of drilled and sowed wheat show the decided advantages of the former. One farmer reports, for example, that he has two pieces, side by side, of like soil, and the drilled portion was injured by frost, say 1-10, the sown 5-10. He says that many in his neighborhood ploughed up their *sowed* fields; one field, *sowed* late in August, produced a fine crop."

Clermont County.—"In my report you will see that I have given 8, or 2-tenths, as the average amount destroyed by winter (cold) of that sown by drill, and 6, or 4-tenths, of that sown broadcast. I do not know but what the difference in favor of the drill is greater."

Van Wert County.—"Early and drilled wheat decidedly best."

Hocking County.—"The winter wheat in this county was damaged mostly by the severe winter and winds; where it is protected from the sharp winds it is good, but where it was exposed it amounts to very little. Some of our farmers *ploughed* in their wheat, and such is better than that *harrowed* in."

Warren County.—"There is very little difference in the appearance of the drilled and broadcast; what there is is in favor of the former."

Loraine County.—"The drilled wheat suffered least; mine was drilled, and I have over two-thirds of a crop, whilst my neighbors' is totally destroyed."

Knox County.—"The difference in favor of drilling is not so apparent as usual. Protection from the piercing wind, on the first of January last, had a more favorable influence on the wheat crop than any other cause. Take our county over, and we will scarcely have more than our seed. When I found that my wheat was killed, as the next best thing I procured spring wheat, and at the proper time put it in with a drill running crosswise of the last fall's drilling, thus leaving the old to grow with the new. I have just finished cutting a No. 1 crop of wheat; I cannot tell how much per acre, but the crop is a good one in quantity and quality. If that course had been generally pursued, the advantage to the country would have been immense."

Defiance County.—"Drilled wheat has done very well, and shows its good effects this season. Late-sowed wheat is not so good as usual. I think there are at least 5-10 difference, and in favor of drilled wheat."

IOWA.

Des Moines County.—"The winter wheat was frozen *in* the ground; therefore no difference between that sown broadcast and by the drill."

Dallas County.—"Drill sowing is decidedly the best, and rolling the ground heavily afterwards would have been an effectual remedy this season. Fields treated thus suffered but little." [We suppose our correspondent speaks of rolling in the spring, and not immediately after the drilling.]

Floyd County.—"One of my assistants says he had some experience in drilling spring grain. In an ordinary season good broadcast sowing is equally good as drilling; but in a dry season the drill is the best."

MICHIGAN.

St. Joseph County.—"The grain drill has not been used extensively in this county, but when used properly the results show a decided advantage in that mode of planting."

Wayne County.—"The drilled wheat suffered equally with the broadcast, save where drilled north and south, when, in some places, where the ruts were deep, it was sheltered from the sweeping west wind. Drilling has some advantages, and also some disadvantages. Its advantages are, it is less liable to upheaval, and on loose soils to have the earth blown or washed away from its roots. Its disadvantages are, that in wet seasons it is liable to be submerged in the ruts on undrained soils. When the ground is frozen, and a partial thaw occurs, the ruts are filled with water, and frequently freeze over immediately on the cessation of the thaw, and the wheat is frequently smothered. As far as my experience goes, drilling is, on some soils and in certain seasons, an advantage; in others, an injury. I found also the sweeping wind, rather than the intensity of the frost, has destroyed the wheat. I find northeastern exposures, where it must have been equally cold with other parts of the field, escaped by having the wind arrested by the fences; that sowed by the drill, being in trenches, suffered but little. I sowed last fall four hundred acres, both with drill and hand. The hand-sowing is not worth cutting, whilst the drilled is fair. The same is the case as far as my observation extends."

Livingston County.—"Wheat that was sown on land cultivated last year in tobacco is in more than an average growing condition. That upon land cultivated in Indian corn less than an average."

MARYLAND.

Cecil County.—"It is difficult to compare wheat sown by drill and broadcast, as nearly all is sown wholly by the one or the other method. Mine was sown broadcast, and it was considerably injured. A neighbor sowed by drill, and his is also injured.

After several experiments, he is rather unfavorable to drilling. He thinks too much open space is left unoccupied between the drills. A part of his ground he drilled both ways, putting on, as he thinks, an equal quantity of seed, or nearly so, in both portions. That drilled both ways has much the best appearance. My own opinion is, that drilled wheat is less injured than broadcast. A few years ago, a neighbor, an Englishman, ribbed a part of his ground in ploughing the second time with a right-hand plough, running each succeeding furrow at the right-hand of the preceding one. He then broadcasted the whole and harrowed. That on the ribbed portion came up as if drilled, only a little wider apart, and was by far the best when harvested. I tried the same method once, and drilled alongside of it. I could see no very material difference in the yield."

Carroll County.—"The *early*-sown wheat is very good, but the late-sown is below the average. When will the farmers learn wisdom?"

NEW JERSEY.

"The reports from this State, and others in the east, show that the winter was faverable, hence no test could be well made of the relative merits of drill and broadcast sowing. In one county of this State, where much wet soil prevails, the broadcast was thought to be injured one-fourth, and the drilled uninjured; and I also find that new land has escaped when equally exposed. Can you give us the philosophy of this?"

MISSOURI.

Crawford County.—"There has been hardly the usual amount of fall wheat sown in this section on account of the drought last fall, which lasted till October 1. Having been sowed late, and got a poor start, a large amount has been frozen out, which will cause our crop in this section to be poor. Spring wheat is not sown here yet; I am satisfied it would do well."

St. Louis County.—"There is unfortunately far too little drilling in of wheat in this neighborhood, so but little can be said by way of comparison, but it is all in favor of the use of the drill."

KENTUCKY.

Mercer County.—"The past winter has demonstrated to me beyond a doubt the advantage of the drilled over the broadcast sowing of wheat. Owing to the system of labor in Kentucky, and the inability of the negro generally to handle machinery, but little of it has been used until within the last few years, in either sowing or harvesting grain. But from my observation in other States of the present growing crop of wheat, the difference in the mode of sowing is marked, and altogether favorable to the drill. Also, I am satisfied that *early* sowing and *deep* ploughing are the best, as attested by the present growing crop."

Garrard County.—"With regard to the value of the drill over broadcast sowing, I will remark that the drill is an innovation on the 'institution,' and of course very cautiously introduced; requiring more intelligence to work them than brute force, therefore not extensively used. But I think the difference fully as great as I have put it. In that sown broadcast, I think the yield will be less than a third of a crop, while that drilled will be very nearly a full crop—all taken together, a little over half a crop."

Oldham County.—"I have sown with the drill several years and have never had a failure, while broadcast this year nearly all froze out in February and March, or, more properly speaking, froze *in* the ground. The land was very dry in February, when the extreme cold weather came, which froze the wheat to death, of most of the broadcast sowing, leaving the roots of the wheat in the ground, but entirely dry."

PENNSYLVANIA.

Armstrong County.—"Winter wheat not half a crop; the drilled is much the best—has stood the freeze much better than the broadcast."

Lehigh County.—"Since 1850 the drill has been in general use in this county. At present two-thirds of the farmers use it, having found it a safeguard against freezing out, and a saving of seed."

Westmoreland County.—"The past winter has, I think, thoroughly tested the question whether drilling is superior to broadcast sowing for fall grain. In this county all have suffered equally. On my own farm I drilled about the half of a ten-acre lot, and sowed broadcast the remainder. At the present time I can see no difference, each portion being badly injured by the severe weather of the past winter. But in ordinary seasons drilling may be advantageous; still I think it is an open question, to be decided, not so much by the *mode* of sowing, as by the previous preparation of the soil."

Montgomery County.—"We have had a very favorable and wet spring. Wheat, though frozen out considerably, looks well; that sown by the drill was not much injured, but that sown broadcast was, at least, three-tenths frozen out."

NEW YORK.

Chemung County.—"The present winter has leveled all distinctions in effect of drill and broadcast sowing. There is no difference in a field of mine, one-half drilled and one-half broadcast. The wheat was not thrown out, but *dried* to death. Some fields look better in sheltered situations, as a wood or hill on the northwest side, also by or near fences."

Chautauqua County.—"Wheat that was drilled in last fall looks much better now than that sown broadcast. Drilled wheat stands freezing and heaving out much better than broadcast sowing."

Ontario County.—"As we have got through harvest, I will give you the information you ask, relative to drilled and broadcast-sown wheat. We had sixteen acres of wheat drilled, which is estimated at thirty bushels per acre, whilst the next field sown broadcast is estimated at but ten bushels per acre. Both fields were cultivated in the best manner, are tile-drained, and were well manured. We drill *two* bushels of seed per acre, and sow *three* broadcast. So you will perceive that there is a great saving of seed by drilling. It also, by leaving the ground in ridges, protects the plant from the cold winter winds, and in the spring, as the earth thaws out, it crumbles and falls around the roots. Hence the roots are not injured by alternate thawing and freezing, as are those of the broadcast sowing."

COMMENTS.

1. The most prominent thing that strikes the reader of these extracts is their almost unanimous testimony for the superior excellence of drill sowing. Even where broadcast sowing is regarded as equal if the same care was observed in the preparation of the soil, yet, if it would in all such cases be equal to the drilled, there still remains the fact that broadcast sowing leads to insufficient preparation, and drill sowing to its observance. Add to this reason the fact stated by the last correspondent, that broadcast sowing requires a third more seed, and it must be conceded that this mode should be entirely abandoned. But other and stronger reasons for the use of the drill will be given in their proper place.

2. Several correspondents refer to the fact that the freezing of last winter of the wheat roots was not of the usual character generally, the freezing *out*, as it is called, but was the freezing *in*, that is, the roots were destroyed whilst yet *in* the ground, and had not been first heaved out. It is proper, therefore, that these differences should be clearly understood, so that the relative advantages of drilled and broadcast sowing may be more certainly seen.

Freezing *out* is caused by the ground being first saturated or soaked with water and then frozen deeply. When the water is changed to ice it expands, and with this enlargement the soil is heaved up. If the soil be examined when in this state, it will be found full of ice in small divisions, giving it the appearance of honey-comb. If this ice is suddenly thawed, and the water and the ground sink down together, no injury is done to the roots, unless the cold is very intense. But if, as is often the case, the thawing is gradual during the day, and followed by cold, freezing nights, then the injury is great, and is occasioned in this manner: as the ice is thawed on the top, the water runs down into low places, and is evaporated quickly, for the cool northwest or western winds are so very dry, and so highly and positively electrified, that their capacity for absorbing moisture is much greater than that of the warm winds of summer. Every housewife, when hanging out the washed clothes to freeze dry, gives evidence of this fact. Soon the top soil is dried, it sinks down as the ice leaves it, into a dry and loose condition. But the roots of the wheat cannot sink down with them, because their lower parts are held fast by the ice which remains about them unthawed. Thus gradually they are bared, and whilst so the night's freezing kills them. A few such upheavals and freezing destroy a large portion of the crop. Now, it is against this destruction that drilling is especially advantageous, for reasons that will be stated presently.

Freezing *in* results from the extreme intensity only of the cold. Beyond a certain degree of cold, winter wheat is as easily killed by it as oats, and spring wheat is at a lesser degree. Hence the necessity, in high latitudes, of the protection of the snow. Roots that are weak, from not having time to become strong, from late sowing, or from the soil being so poor that it does not afford them sufficient nutriment, have not that vitality which older or better grown roots have, and are therefore more easily killed. A correspondent asks why wheat sown on *new* soil stands the winter better? Because, being a rich soil, it has grown a more vigorous root, and also because new ground, being more porous, allows the water to pass through it more readily, so that freezing does not upheave it so much.

These facts explain several other things seen in the experience of the past winter, They show why the *late*-sown wheat was killed, although drilled in, and why the field sown broadcast in August produced so good a crop. Hence is seen, too, that to determine the relative advantages of drill and broadcast sowing, we should know the nature and condition of the soil, and the time of sowing; for whatever the excellencies of the drill may be, it cannot take the place of manures, or deep ploughing, or a thoroughly pulverized soil, or timely sowing. The field of 30 acres, referred to by our correspondent from Marion county, Ohio, was destroyed because the soil was not sufficiently rich to grow a root having a vitality sufficient to endure the intense cold of last winter, made more intense by the large quantities of water which were held by the tenacious character of the soil. If to these unfavorable conditions *late* sowing had to be added, who can rationally expect that the drill, whatever its excellencies, could overcome the combined power of such evils?

3. And here the conviction must force itself upon the mind of every reflecting reader how much American agriculture needs the aid of well conducted, closely-observed, and long-continued experiments. Partially observed results so often lead to erroneous conclusions that no satisfactory and certain progress can be made by their aid. Hence the fact that but few things connected with our agriculture have been determined. Most of them remain now, as they were a quarter of a century ago, unsettled questions, because results have been so imperfectly seen. But even by them some questions have been settled, though obscurely, and among these is the general conviction of the utility of drill-sowing, as is manifest from the above extracts of the correspondence of the Department.

Experiments should be made in every latitude, and hence this Department cannot make them. But in the establishment of the Industrial Colleges, under the donation of Congress, the future of our agriculture will not labor under the disadvantages of the past and present; but as the soil becomes more worn by our vast production, there will be found the means of determining the agencies of every result, and these, once clearly seen, can be controlled by an enlightened agricultural art.

4. In the absence of such experiments we must rely on general results, and not on individual cases, which are determined by unobserved incidents, and by inherent differences of two or more modes of cultivation. Thus as to drill and broadcast sowing, we must learn their peculiar differences, so that we may determine the results of each, as modified by season, time, soil, manure, depth and number of ploughings, and the pulverization of the soil. The purposes of this article would be uncompleted if a brief examination of their peculiar differences was not made.

Drilling has two general objects in view—saving of seed, and such disposal of it as will best tend to the production of a perfect plant. Of the first, nothing more need be said than has already been. Of the second, everything is attained if the root is well grown in the fall, for such root resists freezing *out;* it has acquired sufficient vital power to resist freezing *in;* it pushes forward the spring growth of the plant to early maturity, thus avoiding rust, and overcoming the attacks of the fly, and it insures a large crop by sufficient stooling, and by better filling the grain. Essential to such results are, of course, a rich soil, properly prepared, and timely sowing; but these do not belong to the sowing, and therefore cannot now be properly considered, for its office simply is to place the seed in the ground. It has in view four things: to place it at the proper depth; to distribute it equally, so as to allow equal space to each plant; to give it protection during winter; and to allow spring cultivation. These will be briefly considered in the order stated.

1. *Proper depth of planting.*—Every observing farmer will admit that ordinarily the fall growth of wheat determines the success of the crop. Now, in a climate like that of the United States, where the dry Indian summer prevails from the first of October to the middle and end of November, it is of the last importance to place the seed at that depth where the roots will

be shielded from the surface droughts, and can reach the uprising subsoil moisture. Drill sowing places the seed about three inches below the surface of the drill furrow. As the roots grow, they pass beneath the drill ridges, thus increasing this depth from the surface. In very *dry seasons* this is of much advantage, but not material in moist ones. And to this fact, probably, we owe the different results stated by the correspondent from Jersey county, Illinois, from harrowing and rolling after the wheat was drilled in.

Broadcast sowing, especially if harrowed and not ploughed in, but barely covers a large portion of the seed. In this condition it is subjected to the influence of the Indian summer droughts, and forced to seek moisture in the dews and slight showers of this season. To learn what effects on the fall growth of the root these different depths of planting have, we need but examine the state of the roots in the spring. Having done this carefully, after a winter of very injurious freezing *out*, we can confidenty declare what that state is.

The roots of the drilled wheat as they came from the stool of the plant were double the number of those from that sown broadcast. The latter were only half the length of the former; either without branches, or with very weak ones. But the drilled root branched once, often twice, strongly. Altogether, the mass of roots from the drilled wheat was, in bulk and weight, more than double those from broadcast sowing.

The roots of the drilled wheat also curved downwards, and this clearly showed the source of their sap to be the uprising sub-soil moisture, for the roots of plants always turn in the direction from which their sap is derived. The roots of the wheat sown broadcast were in an almost horizontal direction, and this direction as clearly indicates their dependence on the surface moisture derived from dews and slight showers. As these in a dry fall are inadequate to the wants of the plant, its growth is checked, and winter finds it unable to endure the cold. The surface roots are soon laid bare, many entirely so, some still have a feeble hold by the ends of one or more of the roots, and there is scarcely a plant but can be raised up from the place of its growth, whilst the drilled in wheat presents a plant firmly fixed and immovable.

2. To have an equal growth each plant should have an equal space in the soil. Drilling gives this, but in broadcast sowing some places receive too much seed, others too little. It collects in furrows and holes, leaving ridges and all the higher parts nearly naked. Crowded roots, obtaining but a weak growth, possess so little vitality that an intense cold kills them *in* the ground, and the first thawing and freezing brings most of them on the surface of the soil to perish.

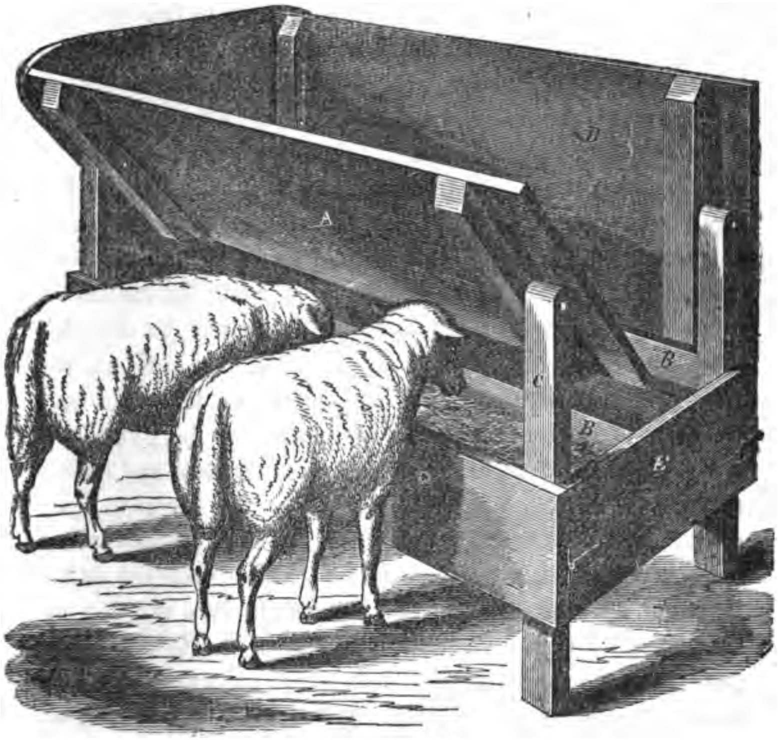
3. Incidental to drill sowing is the fact that the ridges made by the drill teeth lie considerably above the crown of the plant. These settle down from the winter freezing and rains, around the plant, covering that part of the roots nearest the surface. This protection is not found in broadcast sowing.

4. Although in the United States spring cultivation of wheat is unpracticed, except when harrowed in a few cases, yet, as in England, so it will be here, when labor is more abundant; it will be found highly advantageous to run a cultivator between the drilled rows, to loosen the soil, that weeds may be destroyed, cracks closed, and such pulverization and depth of soil had as will enable the roots to more rapidly enlarge. Such cultivation could not be given to wheat plants sown broadcast.

Thus we have these four things from which the superiority of the drill may be readily inferred. And it is the first three of these which have led to the general expression in behalf of drill sowing, which we find in the foregoing extracts from the letters of correspondents.

It remains only to add, that in portions of the United States, as in the eastern States, where the fields of wheat are small, and in consequence, each farmer does not wish to incur the expense of a drill, it would be found advantageous for farmers either to club together in the purchase of one, or else to hire the drilling of their fields, as in many places in the west it is done, in past years at from 40 to 50 cents per acre. The seed saved will almost pay for the drilling.

HALE'S IMPROVED SHEEP-RACK.



In the economical feeding of sheep, much depends on the kind of rack used for the fodder. Many racks are objectionable, from the waste of fodder which they allow, and others from the dust and other matters which fall into the wool about the neck and head of the sheep while they are feeding. The rack above represented is free from these objections and may be converted into a shearing table, or a weather-proof shed for salt, in summer. It will be pretty well understood from the following description:

The engraving represents one side (A) of the rack turned in, disclosing the cribs, or feeding troughs (B), and the internal arrangement of the racks, or troughs, more properly speaking. These feeders (A) are swung on pivots in the upright posts (C), and when in the position indicated in the engraving on the side where the sheep are feeding, permit them to have access to the fodder at all times. When roots or fine feed are used in the cribs or troughs, it is necessary to clean them out before distributing the feed; and to do this the feeder-boards (A) are turned up, as shown at (D), and the attendant can go inside and sweep them out through the door (E), which can as well be hung to the side posts, without being hindered or delayed by the crowding or desire of the sheep to get at the feed. The feeding-boards can also be turned up in a horizontal position, so that by merely placing a bar underneath the two leaves when so turned up, a table is made, which may be used for shearing sheep; or by partially inclining the sides in the form of a roof and placing a ridge-piece over them, the salt which it is usual to supply the sheep with can be put in the trough, instead of scattering it around under foot and on the rocks to be wasted; the inclination of the roof serves to keep off rain and dew, and it is thus turned to good account in this respect. There is a convenient and suitable walk the entire length of the rack, between the inclined feeders, and the attendant can step in from the floor and place the fodder at the further end first, and evenly distribute it throughout,—the sheep feeding from each side. When desired, grain can be fed on one side and vegetables on the other, to different flocks feeding from the opposite sides, none of which can be wasted, or reached by the sheep on the opposite side. The advantages claimed for this rack, which can be made of any desired length, are the following:

1. *Great convenience in feeding,* with either hay, grain or vegetables.

2. *Economy in cost,* which is less than that of any other rack,—of course varying somewhat by the cost of lumber.

Economy in space, as only two feet and eight inches in width is required for flocks to feed on each side—whether the same or different flocks. *Economy in fodder*, as none can be wasted or soiled under the feet of the sheep.

3. *The preservation of the wool* on the necks of the sheep, and keeping the same perfectly free from seed, chaff, or other impurity,—which amounts to a large item in the aggregate where large flocks are kept.

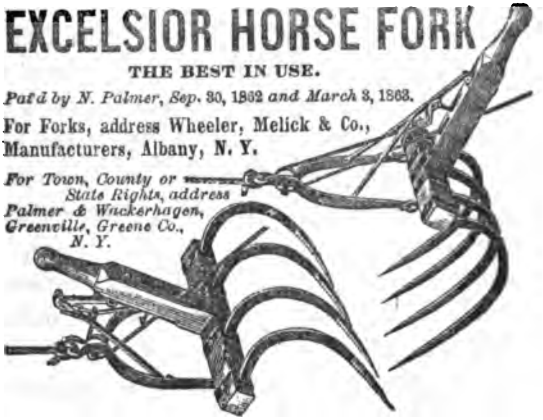
4. *Greater convenience* to sheep in feeding, as the racks are made of the height for sheep to stand and feed in a natural position. They can easily be raised from the floor, to retain the same relative position, when required by the filling of the pens with manure, &c.

Of the numerous testimonials which have been given by persons who have used this rack, the following, from Dr. George B. Loring, a distinguished farmer, of Salem, Mass., is herewith presented:

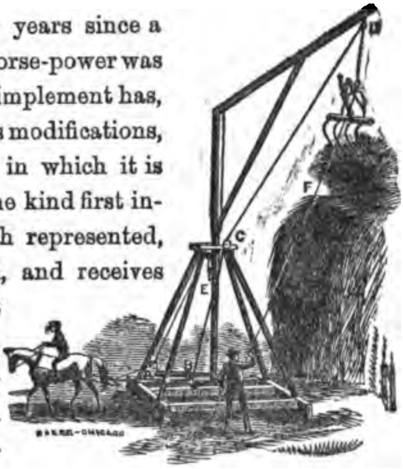
"I have used Hale's improvement on Eaton's sheep-rack myself, and have also introduced it upon the Experimental Farm of the Essex county (Mass.) Agricultural Society. One of my friends, a large sheep owner in Vermont, has used it, at my solicitation. In all these instances it has proved to be entirely satisfactory. In feeding hay or straw I cannot find that a particle is wasted, and it is easy of access to the sheep. For feeding grain and roots it cannot be surpassed. Nowhere, in visiting the flocks of New England, have I seen anything equal to it; and I only wonder, when I see the great number of inconvenient and wasteful racks in use, that it is not universally adopted. For myself I would almost as soon abandon my sheep as dispense with the rack."

For further information in regard to the rack, or in reference to rights to use it, address the proprietor of the patent, Robert Hale, Esq., Chicago, Ill.

PALMER'S HORSE PITCHFORK.


EXCELSIOR HORSE FORK
THE BEST IN USE.
Pat'd by N. Palmer, Sep. 30, 1862 and March 3, 1863.
For Forks, address Wheeler, Melick & Co., Manufacturers, Albany, N. Y.
For Town, County or State Rights, address Palmer & Wackerhagen, Greenville, Greene Co., N. Y.

It is upwards of twenty years since a fork for unloading hay by horse-power was used in this country. The implement has, however, undergone various modifications, and in some of the forms in which it is now made, is superior to the kind first invented. Palmer's, herewith represented, has been extensively used, and receives general commendation. At the farm attached to the Michigan State Agricultural College, one was used last year, with results entirely satisfactory. A general idea in regard to the manner in which these forks are made, and the way in which they are used, may be obtained from the cuts and the accompanying description. One of the figures represents the mode of using the fork in stacking hay, and the others show the form of the



fork, and its position when loaded and when discharged. The manufacturers, in their descriptive advertisements, say:

"With the pulleys furnished with the fork, it can be rigged to deposit the hay in any part of the mow by simply pulling a small cord. It is equally adapted for stacking. The handle being short, is out of the way in going over or under the beams, through windows, &c. The bale and brace being made of *wrought iron*, and the tines of *steel*, and *sickle-shaped*, it is very strong and durable, and will hold as much as a horse can draw. The bale folding to the handle when the hay is discharged, it occupies less room to work it than any other. The head of this fork is protected by our patent self-tightening bands, through which the tines pass, making it impossible to break. Although very strong, it is small and compact, and can be used by a boy. It will take off a load of hay, ordinarily, in three to six minutes."

E. B. Powell, of Detroit, is the agent for the sale of this fork, and rights to use it, for the State of Michigan.

SWINE---CHARACTERISTICS OF BREEDS, &c.

BY SANFORD HOWARD.

Geological researches have proved that the Hog is one of the most ancient of mammiferous animals. His fossilized bones have been found in various places, associated with those of the Mastodon, Dinotherium, and other animals long since extinct. An able zoologist (Martin) observes: "Of the identity of these bones with those of the ordinary wild hog, all doubt has been removed by the most rigorous comparisons." The same writer remarks: "It were useless to ask how it is that, while the Mammoth and the Mastodon, the Urus, the huge Red Deer, Hyenas, enormous Bears, and powerful feline animals, have perished in times geologically recent, the wild hog continued its race. We cannot solve the mystery. It has escaped the fate of these animals, its contemporaries, whatever might have been the cause of their own annihilation, and though no longer a tenant of our island [Britain] it is spread throughout a great portion of Europe and Asia."

The hog is not a native of America. The South American peccary, though of the same order, belongs to a different genus. But in the uncultivated parts of Europe, Asia and Africa, the wild hog has existed from time immemorial, and no less than eight species are enumerated by naturalists as inhabiting those countries at the present day.

The domestic hog was evidently derived from the wild, though it can hardly be supposed that any one species of the latter has been the parent of all the domestic breeds. On the contrary, the great diversity of characters which the domesticated animal presents in different countries, is probably owing in a great degree to its affinity with various original stocks. Experiments,—particularly those made under the direction of the Zoological Society of London, and the Society of Acclimation of Paris,—have shown that several of the wild species will interbreed, that the wild species will breed with all domestic varieties, and that the offspring of all these crosses will readily amalgamate—the progeny continuing to be prolific.

The subjugated animal is, however, very different in disposition and instincts, from his untamed ancestor. The common hog is as dependent as most other domestic animals. In his natural state, on the contrary, he is sagacious, bold and independent. When of mature age, and in full possession of all his faculties, he acknowledges no superior, and will not turn from his path for the proudest beast of the forest. Even the tiger and lion have found themselves unable to withstand his furious charge, and have been laid in the dust never to rise again by wounds from his formidable tusks.

But the domestic hog soon regains many of the primitive habits of the race, when allowed his liberty in situations where he can supply himself with food. The semi-wild character of the "woods hog" of our Southern and Western States, shows this. Even in his ordinary bondage, he is by no means the stupid and senseless animal which some have imagined him. He frequently manifests considerable intelligence, and his intellect is susceptible of great development. Everybody has heard of "learned pigs," some of which, besides performing other tricks, would spell out various names by arranging letters of the alphabet. Pigs may also be taught to defend themselves against other animals. An advertisement appeared not long since, announcing that a "fighting pig," weighing forty pounds, would be matched against any dog without regard to size.

A more extraordinary instance of the education of this animal, is that of the "sporting pig," described in *Daniel's Rural Sports.* This animal, a black sow, called *Slut,* was acutally, according to the account, broke to find and stand game, like a pointer dog. She was of the sort of swine which run in the New Forest (England), where they chiefly obtain their support. She was trained by the brothers Toomer, game-keepers to Sir

Henry Mildmay. "After a few weeks' trial," says the statement, "she could retrieve birds that had run as well as the best pointers, nay, her nose was superior to the best pointer her trainers ever possessed, and no two men in England had better." She appeared to take great delight in hunting, and often went alone the distance of seven miles, from the residence of one of the Toomer's to that of the other "as if to court being taken out shooting." She lived till she was ten years old, and was then killed because she was suspected of having aided in the disappearance of sundry lambs. She is said to have got fat and sluggish, and to have weighed 700 pounds.

It is but a few years since it was very common to hear an expression signifying that the breed of a hog is in the food he gets. This notion has been, to a great extent, eradicated, but is not yet without advocates. There are still some persons who do not believe there is anything in the breed, because, they say, they can't see why one hog should not fatten as well as another.. But is that a good reason for denying the fact? Our belief extends to many things in plants and animals which we cannot clearly see or understand. We cannot see how it is that, of a parcel of apple or pear seeds—all of which to outward appearance, are just alike, and probably would appear the same in composition, according to the nicest chemical test—some will produce excellent fruit, and others, with precisely similar advantages of soil and climate, fruit which is crabbed and austere. We cannot see how it is that the bear should line and cover his frame with fat to an amount equal, perhaps, to half his whole weight, and which supplies his lamp of life for nearly half the year, while the wolf and the fox remain gaunt and lean. We cannot see how it is that the same kind of food, when eaten by the ox, the sheep, the hog, the turkey, the common fowl, or the goose, produces meat which, to human taste, is of very different qualities.

All these effects are very obvious; yet we cannot see their causes, nor fully understand them. All we can say is, they result from the *nature* of things. They show, however, that there is in the original germ of plants and animals, a principle which produces certain peculiarities, greatly affecting, in many instançes, their value for man's purposes. This principle is not only manifested in the characteristics of different species, but exists, more or less, in varieties of the same species. We see its effects in the different kinds of wheat and other species of grain—in varieties of peas, beans, apples, potatoes, &c.—and in the peculiarities of different breeds of the dog, the sheep, the hog, and other domestic animals. It is the business of man to study these peculiarities, and secure and apply them in those ways which will render them most subservient to his wants.

It is to be regretted that certain differences in breeds of swine have not been demonstrated by careful and exact experiments. We are, however, in possession of some general facts in the case which are of great importance. Many farmers, for instance, have found that on the same amount and kind of food, some hogs will gain much faster than others; that some will become fat on uncooked vegetable food—as raw potatoes or apples—while others require grain or meal to bring them to a condition suitable for slaughtering; that some will keep in good order and even thrive on clover or grass only, while others will scarcely live on such fare; that in some the tendency to fatten is so great that they will only breed when kept on very low diet.

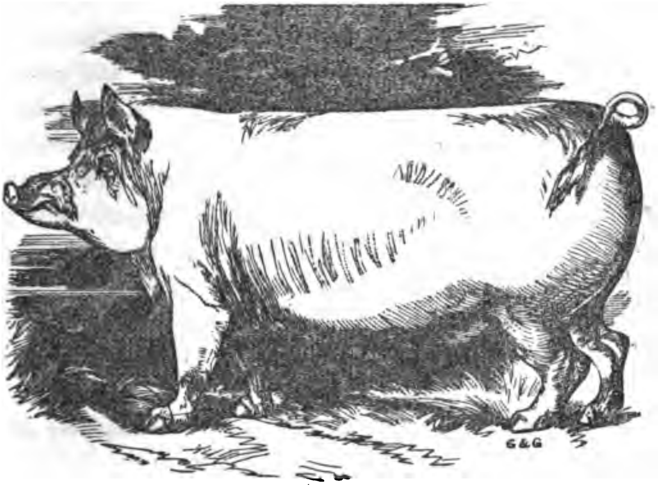
There is not only a difference in the *amount* of meat which different swine are capable of acquiring from an equal amount of food, but there is also a great difference in the *quality* of the meat. Some persons, doubting this, have said "pork is pork." So beef is beef; but is there not a great difference in the flavor and texture of beef from cattle of different breeds? This difference is so well understood in England, that the prices of beef are to a considerable extent regulated by the breed—the West Highlanders and Galloways taking the first rank, next the Herefords and Devons, and next the Short-horns. Breeds of sheep and swine exhibit similar and not less striking differences. Some swine have a thick skin, with flesh of an open, coarse texture, and unpleasant flavor; others a thin skin, with fine-grained, well-flavored flesh. Some convert their food almost wholly into fat, while in others it enters chiefly into the composition of muscle. In some the fat is accumulated chiefly on the belly, and is of a soft, oily nature; in others it is laid more on the back, and is comparatively firm and hard.

Of course the breed should be chosen with reference to the purposes in view. If *lard oil* is the principal object, the animal which will give the greatest quantity of soft fat for the food consumed will be most profitable. For barreling, *clear pork* is the main object, and the animal which will give the greatest quantity of solid fat on the back and sides is preferable. This is the description of pork which is chiefly consumed in the Eastern States and in the fisheries. In the Southern and Western States pork is used largely in the form of "bacon"—the whole of the meat is "dry-cured" and smoked. Where this is the object, the clear fat, which is so much prized in other cases, is not desirable, but a carcass which, like the Irishman's pig, gives a "strake o' fat and a strake o' lean," is more suitable.

The swine of the United States have been derived chiefly from great Britain, though occasional importations have been made from other countries. The British stock of the present day consists of various mixtures of the aboriginal race of that country with various Asiatic stocks—chiefly Chinese and Siamese. Not one of the present esteemed breeds can be said to be of unmixed origin. Youatt, in his treatise published in 1846, observed that the old breeds were "rapidly losing all traces of individuality under the various systems of crossing to which they are subjected." The old stock, which "with trifling degrees of difference," it is said, "was spread over the greater part of England," is described by Martin as "large, coarse, unthrifty, with a long, broad snout, large, flapping ears, low in the shoulders, long in the back, flat-sided, long in the limbs, and large-boned, with a thick hide covered with coarse bristles. They were enormous feeders but slow fatteners, consuming more food than was repaid by their flesh." But he observes that the "general system of crossing now pursued tends to the establishment of a uniform race throughout every county—that is, a race presenting the same outstanding characteristics."

Before giving a description of the various breeds, it may be well to observe that the general wants of community in relation to pork, can be best supplied by two descriptions or classes of hogs, one for supplying the market with meat to be eaten fresh, and for baconing, as above mentioned; the other for making fat pork for barreling, &c. This classification will therefore be adopted in the remarks which follow. The breeds whose special characteristic is the formation of fat, will be first considered, and, as having been the principal stock in changing the character of the old English, the first to be noticed is

THE CHINESE.—There are doubtless various breeds of swine in the "Celestial Empire." Specimens brought from that country are frequently seen presenting so marked a contrast of characters that no one would hesitate to pronounce them of different breeds. They vary greatly in color, from white to black. Some of the early importations made to England and thence to this country, were black, and the idea appears to have been held that this was the invariable color of Chinese swine. Hence, Culley, who wrote in the year 1784, speaks of "the Chinese, or black breed." Youatt makes two distinct varieties of the Chinese, "the white and the black." The race, however, in all its variations, possesses the common characteristic of fattening easily. They are small-boned, and acquire great weights in proportion to the bone and offal. Those brought from their native country have seldom that perfection of form which is most esteemed in animals of this kind, and which the cross-bred descendants soon acquire when skilfully bred. The pure Chinese fatten too much on the belly and too little on the back, and the fat is inclined to be soft and oily. Youatt says, "they do not make good bacon, and are often too fat and oily to be generally esteemed as pork." The females are sometimes singularly prolific. The improvement which has been effected by means of the Chinese race, has resulted in the first place in lessening the bone and increasing the aptitude to fatten of the stocks with which they have been crossed, and afterwards selecting from the cross-bred stock such specimens as possessed the requisite points as to symmetry.



[Fig. 1.]

The Improved Suffolk Breed.—This breed, represented by figure 1, is one of the most highly esteemed and valuable. Its origin, according to Youatt and Martin, was the old Suffolk crossed with the Berkshire and Chinese. Youatt says: "those arising from the Berkshire and Suffolk are not so well shaped as those arising from the Chinese and Suffolk, being coarser, longer-legged, and more prominent about the hips." He concludes: "On the whole there are but few better breeds in the kingdom than the Improved Suffolk." Martin says this breed "stands first;" and he describes the animal as "rather small, but compact, short-legged and small-headed; the body is round and they fatten readily." Rham, in his *Dictionary of the Farm*, says: "Suffolk pigs are perhaps on the whole, the most profitable breed in England."

For the introduction of this breed into the United States, we are indebted to the late William Stickney, of Boston. He made various importations, comprising some of the best specimens of the breed to be had in England, from 1842 to 1848. Since then various other importations have been made by different persons, and the breed has been pretty generally disseminated over the country. The reputation of the breed has suffered some from the indifferent and worthless animals which were scattered over the country a few years since by unprincipled speculators. A mistake was to some extent committed in breeding from stock which, for this climate, was too lightly coated, and which, as a consequence, were rather deficient in constitution. But the leading breeders have applied the proper corrective, and are producing animals better covered with bristles and of more substance. There is no difficulty in obtaining specimens of this breed that will reach the weight of 350 to 400 pounds, dressed, at twelve to eighteen months old. If fairly fed, they will always be in condition to kill from the time they are a month old.

Inquiry is sometimes made in regard to the dark spots which occasionally appear on Suffolk swine. Unless there has been some late cross of the stock, the spots are attributable to the "out-cropping" of Berkshire and black Chinese blood, which, as above stated, constituted, in part, the origin of the breed. In most instances, the spots alluded to are merely on the outer or scurf skin, and do not change the color of the bristles. In some instances they do not appear on the animal till it has reached the age of several months.

The Large Yorkshire Breed.—This breed is of the largest class—specimens frequently reaching the weight of 600 to 700 pounds, and sometimes 800 pounds or more, dressed, at two to three years old. A few years since, the writer saw, at an exhibition of Royal Agricultural Society of England, a sow of this breed, with six sucking pigs, six weeks old, the weight of which (that is of the sow) was, according to a card attached to the pen, upwards of *eleven hundred pounds*. At the same exhibition there was a boar of the same breed, whose weight was certified to be upwards of *ten hundred pounds*, though he was only in middling condition. Considering the enormous size of these animals, they are not coarse. Their shape is generally good, the legs straight, the back rather arched, and well calculated to sustain great weight. They seem to be, on the whole, superior to any other very large breed. Their color is uniformly white. James Brodie, of Rural Hill, Jefferson county, N. Y., introduced this breed from England several years since. George Miller, of Markham, Canada West, keeps this breed.

THE LINCOLNSHIRE BREED was formerly quite celebrated. They were large, reaching the weight of 450 to 500 pounds at a year and a half old, and 700 pounds at two years, according to Youatt. An intermixture with the Chinese has produced a smaller stock, maturing at an earlier age. Both kinds have been introduced into this country, but are not propagated as distinct varieties at the present time. It has been said that the large Lincolnshire was one of the parent stocks of the so-called Chester-County, or Chester-White, to be noticed in another place.

THE LEICESTERSHIRE BREED was for a time one of the most popular in England. It was derived from the stock of the celebrated breeder and improver of domestic animals of the last century, Robert Bakewell. It was white, of rather large size, and doubtless did much towards the improvement of the large varieties of Britain, generally. They were, several years ago, well known and quite popular in this country; but the stock has degenerated, and is hardly to be found at the present day, possessing its original characteristics.

THE BYFIELD, OR NEWBURY-WHITE BREED.—This was a stock of American origin, which obtained considerable notoriety. It first attracted attention upwards of sixty years ago. A correspondent of the Boston *Cultivator*, in the issue for April 28th, 1860, gives the following account of the origin of this variety: "About sixty years ago a woman came to market at Newburyport, Mass., on horseback, her load being suspended in panniers on either side of the saddle. Among her stock was a little sow pig. It was purchased by Mr Hase, a butcher at the ship-yards. One of this sow's pigs was purchased by Mr. Richard Little, of Old Town, and one of *her* progeny, a boar, was purchased by Moses Colman, of Byfield. This boar became the sire of the afterwards noted Byfield breed. They were at first termed the Colman breed, but Eben [Gorham] Parsons, Esq., having procured some for his farm in Byfield, he called them the Byfield breed."

This account does not differ much from the most authentic statements derived from other sources. It was said by some persons that the pig which the woman carried to market was either brought from Africa, or was the offspring of one from there. In 1852, the late Col. Jaques, of the Ten Hills Farm, near Boston, in reply to an inquiry by the writer of this article, wrote as follows: "Some forty years since, while on a visit to the late Gorham Parsons's farm, in Byfield, Mr. Parsons introduced me to a neighbor of his by the name of Colman, as being the person who first produced and bred the variety of swine called the Byfield breed. I think Mr. Colman mentioned something about having first obtained a Chinese [or African] pig."

Under the name of Byfield and Newbury-white breed, this stock and crosses from it became widely disseminated, and though no vestige of it has existed for years that could be traced with anything like certainty, or even probability to the original source, yet it has been common to see notices and advertisements of pigs represented to be of this breed, down to the present time.

The Mackay Breed was originated by the late Capt. John Mackay, of Boston. He had a farm at Weston, in Middlesex county, Mass., on which he collected many hogs of different varieties, which he procured in various parts of the world, whither he was led in his commercial intercourse. These various kinds were bred together, and the result was the production of a stock to which his name was applied. The writer of this article purchased swine of Capt. Mackay, at various times —first in 1830—and so far as he is aware, was the first person to give the stock the name by which it afterwards became extensively known. Subsequent experience, however, proved that the stock had not acquired a sufficiently uniform character to justify its being called a distinct breed. The great diversity in the character of the parent stocks, was always more or less manifest. The animals were in general very easily fattened, and were highly profitable. But in pigs of the same litter, there were some which would grow to a large size, and others which, with the same advantages, would always be small. The larger ones would frequently reach the weight of 600 pounds and upwards, at eighteen to twenty months old, if well fed. During the latter part of his career, Capt. M. gave attention chiefly to the propagation of this large stock. In 1834, he sold all his stock to Col. Jaques, of the Ten Hills Farm, by whom it was propagated for several years. It has now become extinct—that is, there is no reason to believe there are any swine in existence which are entirely of the original Mackay stock. The writer knows of none that are as much as half-blood. It is said that what is called in some parts of Illinois and some of the other Western States, the "McGee" and "Magee" breed, is sometimes confounded with the Mackay; but Mr. Emery, of the Prairie Farmer, in an article in the Report of the Commissioner of Agriculture, for 1863, states that the so-called McGee or Magee stock takes its name properly from a breeder in Ohio.

THE BEDFORD, OR WOBURN BREED, originated at Woburn, in England, the estate of the Duke Bedford. It was for some time one of the most valuable varieties known. Various importations were made into this country. The first were sent as a present to General Washington by the Duke of Bedford, about the year 1792. Some of the descendants of this importation were introduced into Massachusetts by Col. Timothy Pickering, who was Secretary of State under a portion of Washington's administration, and who then and afterwards manifested great interest in agricultural affairs. The breed was extensively propagated in Massachusetts for many years, and as hogs of medium size, and especially for slaughtering at six to eight months old, they have never been surpassed. Nothing like a full-blood of the breed has been seen for twenty years or more. Diluted strains of the blood lingered later in what was called the "Hospital Breed," kept at the hospital for the insane, Worcester, Mass., but it would be difficult to recognize a trace of it at the present time.

THE CHESTER COUNTY, OR CHESTER WHITE hogs take their name from Chester county, Pennsylvania. Their origin is said to have been, in part, some large English hogs, much resembling the large Lincolnshire before described. They had considerable local reputation twenty or thirty years ago. Many persons, however, in Pennsylvania, who had kept them, resorted to crosses, more or less, with the Suffolk and similar breeds, several years since, for the purpose of correcting what was regarded as too much coarseness in the Chester stock. Of late, the Chesters have been much sought after by persons whose swine, from various causes, have become too small. The Chester county hog, as the writer first saw it in Pennsylvania, many years ago, may be described as of a white color; of comparatively large size; the head rather large; the nose or snout thick, but not long for the size of the animal; the ears large, thick, and flapping; the body rather long and tolerably round; the back generally hollowing, frequently with a considerable settle immediately behind the shoulders; the legs generally large in proportion to the size of the body, and in fat animals frequently giving way so much as to bring the pastern joints fully to the ground; the skin rather thick, and covered with long, wavy bristles.

Many of the hogs which under the name of Chester-County, or Chester-White have been sent over the country of late years, differ from the above description in having upright and somewhat thin ears, less bristles, and less coarseness of bone—all indicating a cross with some finer stock.

The foregoing list comprises the most popular breeds of swine, so far as relates to the production of *clear pork*. Breeds which form a greater proportion of lean meat properly combined with fat, are preferable for particular purposes. Many families who put up pork for their own use, do not desire so much clear fat; a carcass comprising more lean,—fine-grained, tender and juicy,—could be used with less waste, and would at the same time be more acceptable to the palate. Besides, in our cities and large towns, a great quantity of pork is consumed in a fresh state. To be best adapted to this purpose, swine should be small-boned, only moderately fat, but plump and meaty, the flesh fine-grained and of the best quality as to flavor. Of breeds which are best adapted to these purposes, and for making bacon, the following may be mentioned:

THE NEAPOLITAN BREED.—Martin, speaking of the excellence of Italian swine, says: "The ancient Romans made the art of breeding, rearing and fattening pigs a study, and elevated, so to speak, various strains to the highest perfection We cannot doubt that from those improved races of antiquity, the present pigs of Italy have descended. It is not, we think, overstraining the mark, to regard the excellent breeds of pigs in Italy as the descendants of a long line of ancestry—of breeds established before Rome fell."

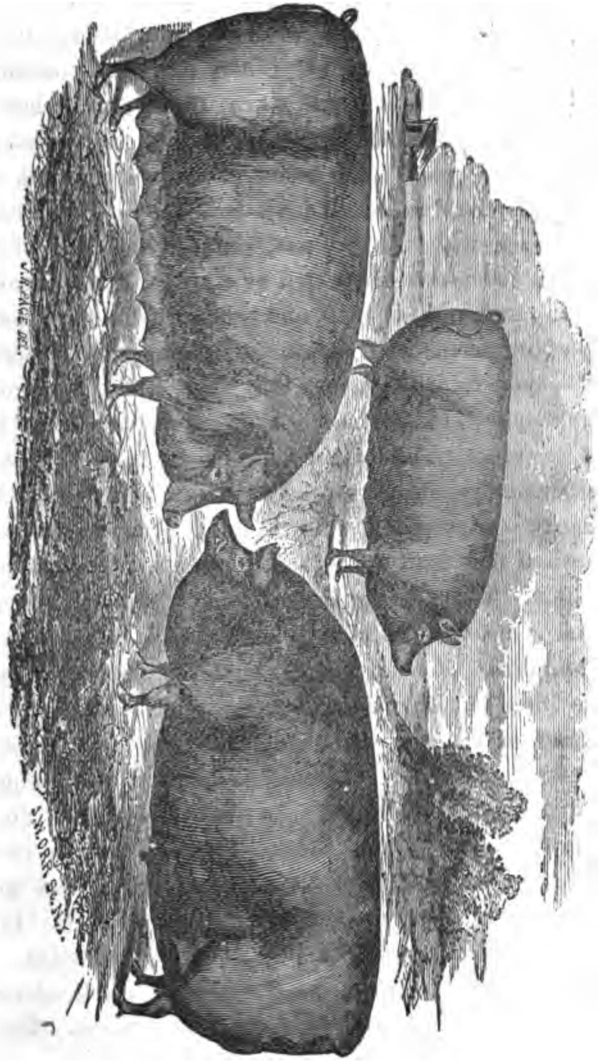
The Neapolitan is the most celebrated Italian breed, and has been the source from which some of the most esteemed English breeds have been, in part, derived. They have also been introduced into the United States, and under proper protection in winter have succeed very well; but they have not sufficient hardiness to bear the exposure which swine ordinarily endure in this country. Their flesh is of the first quality. Martin's description of the breed is as follows:

"The Neapolitan hog is small, black, almost destitute of bristles, and remarkable for aptitude to fatten; it is short in the snout, small in the bone, with sharp, erect ears. But it is by no means hardy, at least in our country [England], and if the sows happen to have litters in winter, it will be difficult, should the weather be severe, to save the young pigs from dying. But as a cross with some of our breeds, as the Berkshire, the Neapolitan race is most valuable. The cross-breed exhibits improvement in form without too great a delicacy of constitution; they have a remarkable tendency to fatten, and though larger and stronger than the Neapolitans, display all their good gualities. * * * The Essex breed is much indebted for its excellencies to the Neapolitan intermixture."

The Improved Essex Breed.—This is one of the most valuable breeds now known. Its establishment is generally credited to the late Lord Western. It has, perhaps, carried more prizes at the shows of the celebrated Smithfield Club than any other breed. As mentioned in the description of the Neapolitan, it was derived from a cross with the race whose color it inherits, with more size, finer symmetry, and much better constitution. Stephens, the author of the *Book of the Farm* and the *Farmer's Guide*, says:

"As to the breed which shows the greatest disposition to fatten, together with a due proportion of lean, I never saw one equal to that which was originated by Lord Western, in Essex. They were exceedingly gentle, indisposed to travel far, not very prolific, however, but could attain, if kept on to a great weight, and so compact in form, and small of bone and offal, that they ivariably yielded a greater weight of pork than was judged of before being slaughtered. The offal was small, and more delicous ham was never cured than they afforded." Martin says: "These animals fatten quickly, grow rapidly, and yield very superior meat. When fattened, they will sometimes weigh 26 or 28 stones (of 14 lbs.), often 18 or 20"—equal to 252 to 392 lbs.

The illustrations herewith given—figure 2—represent animals imported from England by Col. L. G. Morris, of Ford-


J.H.PAGE DEL.
J.W.ORR Sc. N.Y.

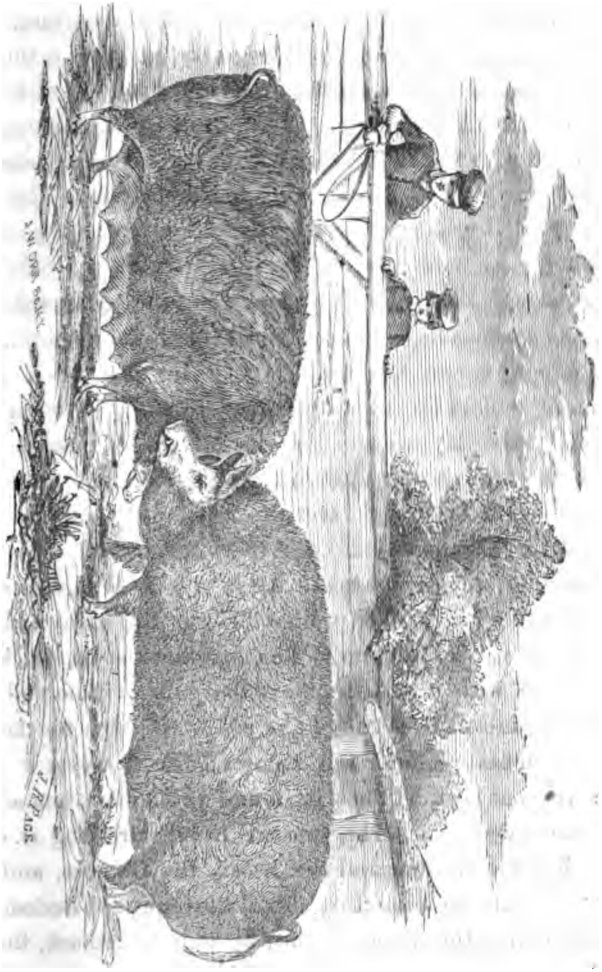
[Figure 2.]

ham, Westchester county, N. Y. They were obtained from W. Fisher Hobbs, Esq., of Marks-Hall, Essex, whose stock was derived from the late Lord Western, the founder of the breed.

THE BERKSHIRE BREED.—The old Berkshire was a hog of nearly the largest class. He is described as having been mostly black, with a large frame, and a large pendent ear. Martin says, "they were often found to weigh from 100 to 110 or 120 stones, of 8 lbs. to the stone." Culley mentions one which, in 1774, "weighed alive, 12 cwt., 3 qrs., 10 lbs., and when killed and dressed, weighed 10 cwt., 3 qrs. and 11 lbs., avoirdupois."

The modern breed is the result of various mixtures of the old with smaller breeds. Youatt says the old Berkshire has been crossed with the Siamese, Chinese, and Neapolitan—a statement which is corroborated by others. It was introduced into this country about 1840, and was for awhile very popular. Many of our people have reason to remember the "Berkshire fever"—some from the money they made, and others from the money they lost, by it. During the excitement alluded to, the breed was represented by speculators as far more valuable than any other, and specimens were sold at enormous prices. But their popularity soon declined, and from the height to which they had been raised they went down to the opposite extreme in general estimation. The causes of this reversion of public opinion, were various. One, and not the least important, was the exaggerated representations of their merits, made by interested parties. People found that they did not come up to the standard which enthusists or sharpers had made, and being disappointed in this, refused to see or acknowledge the true value which actually belonged to the breed. Another cause of their decline was the character of their meat. The Berkshire is, in all its phases, a lean-meated hog. Hence the pork is not so well adapted to barrelling as that of some other breeds. It is, as before stated, clear, unmixed fat, that the packers want.

But it may be supposed that the meat was well adapted to the fresh-meat market, and to making into bacon. This was the case to a certain extent. Some of the Berkshires were well suited to these purposes. The breed, however, varied greatly in character, according as the old Berkshires, or the breeds with which they had been crossed, predominated. The large, lop-eared ones, which sometimes weighed 600 pounds, or upward, each, dressed, were often coarse-fleshed, and not liked on that account. The very smallest, partaking most of the Siamese character, lacked constitution, and were not prolific; but their flesh was fine-grained and good. The medium-sized ones, weighing about 300 pounds, dressed, at twelve to eighteen months old, were in every respect useful hogs, except for the production of *clear* pork.



[Figure 3.]

The illustrations herewith presented of the Berkshire breed —figure 3,—were taken a few years since, from excellent specimens bred and owned by Col. L. G. Morris, of Fordham, Westchester county, New York. Col. M. still keeps this breed.

There is an offshoot of the Berkshire breed in England, known as the Tamworth variety, which is held in considerable estimation—frequently taking prizes among the medium-sized swine exhibited at shows. They are of a reddish-brown color, with darker spots. They are small-boned and well shaped.

THE HAMPSHIRE BREED.—Hampshire bacon has long been regarded in England as of superior quality, and this is thought to be in a great degree due to the breed of swine from which it is produced. Richardson says: "This breed is not unfrequently confounded with the Berkshire; but its body is longer and the sides flatter; the head is long and the snout sharp. The color of this breed is usually dark spotted, but is sometimes black altogether, and sometimes white." Martin says: "He who travels through Hampshire, and looks into the farm-yards, will see some excellent hogs, generally black and middle-sized, with rather a long snout, but compactly made; they are a modification of the old large-sized Hampshire stock, individuals of which in former days were of huge magnitude – and some were carried about for show. This collossal breed is now seldom to seen, but it had its good points; when fattened (and time and much food were required to effect this), it returned, by way of repayment, a weighty carcass. As in all cases, however, the question comes in: Was it profitable—was the repayment for food and time in a just ratio? The answer must be, quick fattening, even with a smaller carcass, a gain of time and provision being included, is one of the points in which the farmer finds himself best remunerated. Slow feeders, however weighty their carcass at best, will not be found profitable when all expenses are calculated. The present Hampshire hog is compounded of the old race and the Essex, the Chinese, and the Neapolitan, with an admixture also of the improved Berkshire."

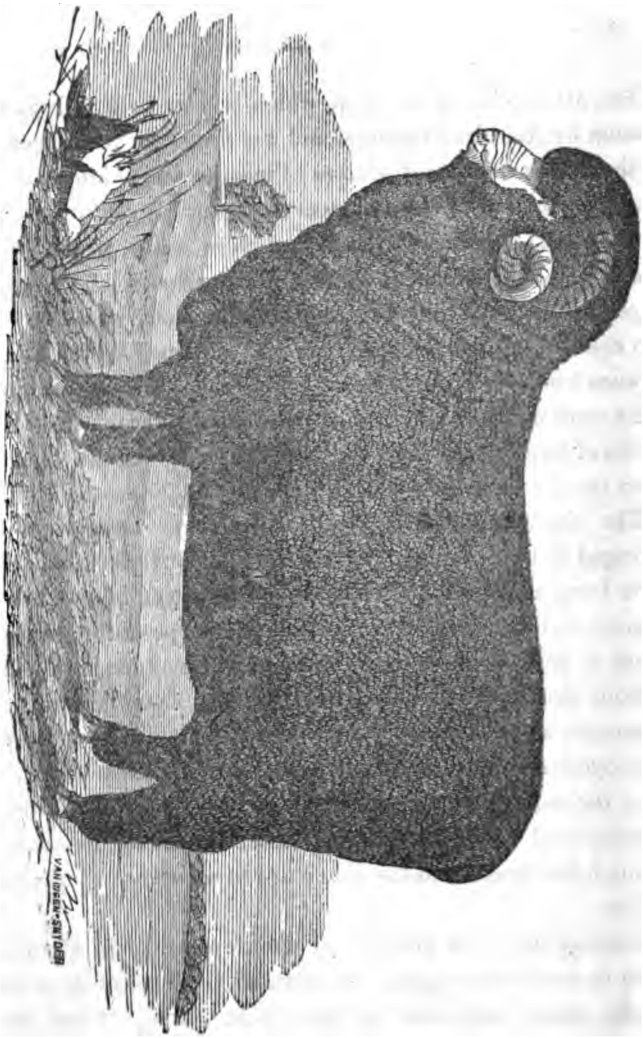
In concluding this paper, it may be well to remark, that in the selection of swine, as well as cattle and other animals, regard should be had to the conditions or circumstances in which they are to be placed. All the improved breeds, so called, though possessing various merits in reference to certain purposes, are less fitted to make a living for themselves than animals less advanced from the original type. The quiet disposition and tendency to fatten, for which some breeds are justly valued, must give place in the "woods hog," or one destined to live by its own unassisted energies, to a habit of activity and a tendency to muscular fibre. Instead of the thin skin and scanty bristles of the *refined* varieties, the hog which is left to provide for himself, must be clad in a manner to protect him from the weather and shield him against the attacks of his enemies. Even in common farm management, the thinness of skin and absence of bristles may be carried too far. These traits, though indicative of aptitude to fatten, impair the constitution, when they exist in an extreme degree, and render the animal unfitted for ordinary exposure.

AMERICAN MERINO SHEEP.

The Merino breed of sheep, which is now held in high estimation by American farmers, and has for some years been one of their most important sources of income, was unknown in this country previous to the commencement of this century. From 1801 to 1811, various importations were made, which formed the principal foundations of our Merino flocks. The earliest importations were from France, and from stock which, towards the close of the last century, had been obtained by the King of France from the King of Spain. The later and larger importations were made chiefly from Spain, after several of the great flocks of that country had been broken up by changes resulting from the invasion by the armies of the first Napoleon.

The characteristics of these sheep have been somewhat changed in this country. In some important particulars they have been improved—that is, they are better adapted to our climate, to our management, and to the purposes for which the fleece is applied, than when they were introduced. We have various stocks, which, compared with the original Spanish, are more symmetrical in form, more hardy, have much more wool in proportion to the weight of carcass, on which account, and from the more even character of the fleece—the proportion of inferior wool being considerably lessened—its aggregate value is much increased, and the sheep are in all respects more profitable.

Some of the most striking of the improvements alluded to seem to have been acquired in Vermont, the basis of them being chiefly stocks imported by Hon. Wm. Jarvis, of that State, and Gen. David Humphreys, of Connecticut. The character of the climate, and the nature of the soil and herbage, doubtless exercised favorable influences in regard to the changes which the sheep alluded to have undergone, though it cannot reasonably be denied that their improvement is in a great degree the result of skill in breeding.



GOLD-DROP.

The *speciality*, so to speak, of the leading type of the Vermont sheep, is the production of a large quantity of wool in proportion to weight of carcass—the *value* of the fleece being relatively high. As affording evidence of the degree in which this property has been acquired, it may be mentioned that a premium offered for sheep producing the greatest quantity of wool in proportion to the weight of carcass, to be shown at the International Exhibition, in Hamburg, in 1863, was taken by George Campbell, of West Westminster, Vermont. The competing class numbered upwards of six hundred sheep, from different countries. After the awards had been made, Mr. Campbell sold the six rams and six ewes, which he took to the Exhibition, to Count Scherr Thoss—an eminent wool-grower of Upper Silesia—for a sum equal to $5,000 in gold,

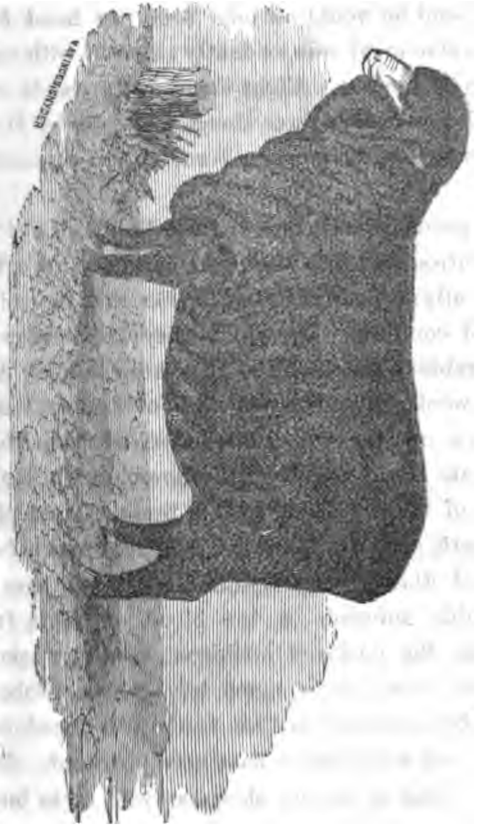
These sheep have now attained certain peculiar characteristics to such a degree that there seems to be no impropriety in bestowing on them a distinguishing name. It is well known that the so-called Saxon, Silesian, and French Merinos are only modifications of the Spanish Merino, and the same reasons which would permit the application of particular names to these families, might be urged with at least equal force in favor of the American. As to the name to be adopted, none seems to be more appropriate than that unanimously agreed on by the New England Wool Growers' Association, at a late meeting, viz: "Improved American Merino."

Portraits of two specimens of the Improved American Merino, are herewith presented. The ram, Gold-Drop, bred by, and the property of Hon. Edwin Hammond, of Middlebury, Vt., was dropped in 1861. He was got by California out of Old Queen. California was by Sweepstakes, out of Beauty 1st. Old Queen was by Long Wool, out of Old Queen's Dam. Sweepstakes was by Little Wrinkly, out of Light-Colored Ewe 3d. Long Wool was by Old Greasy, out of The Lawrence Ewe. Old Queen's Dam was by Old Black, out of First Choice of Old Ewes, &c., &c.,—tracing back on both sides to the Humphrey's importation. Mr. Hammond states that the weight of Gold-Drop's fleece in 1864, of one year's growth, was 24 lbs. 12 oz., unwashed. The weight of his body is not stated. He is not a large sheep, however, as the writer can say from having examined him. Probably his weight is rather under the average of that of the Merino breed. The figure gives a very good side-view of him. He is short-legged, and quite compact. His wool, with the exception of that on the larger wrinkles of the neck, is quite even, remarkably thick, densely covering almost every part of the body, not *gummy*, but pretty oily, and of the light-orange color, which Mr. Hammond prefers. The staple is about two inches in length, very uniform in size from one end to the other, and fine for what is called Spanish Merino—running, according to very accurate measurements by Prof. Miles, of the Michigan State Agricultural College, 1186 fibres to the inch—good Saxon wool measuring 1295.

The value of Gold-Drop as a sire has scarcely been fully proved, comparatively few of his progeny having reached an age at which their properties may be considered developed. If he transmits his leading characteristics with the same uniformity and strength as similar qualities were transmitted by his noted progenitor, Sweepstakes, he will probably eclipse even the wide-spread fame of the latter, as, in a comparison of the two, a summary of the *points* of Gold-Drop would reach the highest figures in the aggregate. In a letter to the writer, dated January 23, 1865, Mr. Hammond states that he had rerefused an offer of $10,000 for Gold-Drop, and that he had sold a "ram lamb," got by him, for $5,000.

The figure of the ewe accompanying this article, is that of one bred and owned by Hon. Wm. R. Sanford, of Orwell, Vt. The drawing was taken when she was a yearling. Mr. Sanford states that she was got by his ram Comet, whose sire was California, the sire of Mr. Hammond's Gold-Drop. Comet was dropped in 1861. His first fleece weighed 10 lbs., his second, 22 lbs. 8 oz., his third, 24 lbs. 8 oz. Mr. Sanford states that previous to 1864, he charged for Comet's services $5 per ewe for the season; that for 1864 he charged $10 per ewe, and that he had as much business as he wished him to do at these rates.

The ewe, Mr. Sanford states, is a twin sister to one of two rams which he sold to Mr. Campbell, and which Mr. C. took to



MR. SANFORD'S EWE.

the Hamburgh Exhibition. Her pedigree traces back to the Humphrey's stock.

Mr. Sanford's flock has long had the reputation of being one of the best in Vermont. An incident somewhat illustrating the high estimation in which his sheep are held may not inappropriately be related here. At the show of the Vermont State Agricultural Society in 1863, Mr. Sanford exhibited twenty-three yearling ewes, bred by himself While Mr. S. was engaged in showing these sheep to the writer of this article, some gentlemen who came to the pen inquired at what price some of the lot could be bought, to which Mr. S. replied that they were not for sale. A price being insisted on, however, Mr. S said he would *not* take $500 per head for any of them. The statement was evidently received with surprise by some of the bystanders. Eight months afterwards, or in May, 1864, that lot of twenty-three sheep was sold by Mr. Sanford to T. D. Barton, of Vergennes, Vermont, for upwards of $600 per head.

Various specimens from some of the best flocks of Vermont, have been introduced into Michigan, and they have been tried here sufficiently to justify the conclusion that the soil, climate, and general conditions by which they are surrounded, are highly favorable to the health of the sheep and to the character of their wool. Hon. Charles Rich, of Lapeer, has kept for several years, on his farm, a flock derived from that of his father, the late Hon. Chas. Rich, of Shoreham, Vt., long celebrated as one of the best flocks in that State. These sheep have done well here, and Mr. R.'s rams have done much for the improvement of other flocks. Within a few years there has been a considerable infusion of the blood of rams from Vermont among the flocks of Michigan, resulting generally in improvement, though in a much less degree, probably, than might have been effected had the stock introduced been in all respects the best which might have been procured. The sooner farmers learn that in buying sheep, as well as in buying fruit trees, it is better to deal with well known and responsible parties, the better it will be for their interest.

DISEASES OF CATTLE.

From a work by the well-known veterinarian, Prof. John Gamgee, on the selection, diseases and produce of dairy stock, published in Edinburgh, in 1861, some extracts are here inserted. They refer chiefly to diseases either common in this country, or to those from the introduction of which danger is apprehended. Of the latter character is the

PLEURO-PNEUMONIA EPIZOOTICA,

or the Epizootic Lung-Disease of Cattle, which within a few years has made its appearance in some of our Eastern States, where its ravages have already occasioned serious loss, and justly created much alarm in reference to other sections of the country. As Prof. Gamgee's opportunities for studying this disease have been extensive, his remarks cannot fail to be read with interest by all owners of cattle. He says:

No malady can be more terrible and ruinous than this amongst dairy stock, and its spread all over the country; its continuance, with scarcely any abatement, must be attributed to the combination of various causes. The chief are, *firstly*, the very contagious or infectious nature of the disorder; *secondly*, inattention on the part of the government to the importation and subsequent sale of diseased animals; *thirdly*, the recklessness of purchasers of dairy or feeding cattle.

The disease may be defined an acute inflammation of the organs of the chest, with the development of a peculiar and characteristic poison, which is the active element of infection or contagion. It is a disease peculiar to the cattle tribe, notwithstanding occasional assertions regarding observations of the disease amongst horses, sheep, and other animals, and which have not been well attested.

The contagious nature of this virulent malady is incontestibly proved by an overwhelming amount of evidence, which I cannot adduce at full length here, but which may be classified under the following heads: *Firstly.* The constant spread of the disease from countries in which it rages to others which, previously to the importation of diseased animals, have been perfectly free. This may be proved with regard to England, where it was carried in 1842 by affected animals from Holland. Twelve months after, it spread from England to Scotland by some cattle sold at All-Hallow Fair, and it was only twelve months after, that cattle imported as far north as Inverness took the disease there. Lately, a cow taken to Australia, from England, was observed to be diseased on landing, and the evil results were limited to her owner's stock, who gave the alarm, and insured the effectual check to further spread. Lastly, the recent importations of pleuro-pneumonia into the United States from Holland, seems to have awakened members of the agricultural press here, and convinced them of the stubborn fact that our cattle have been decimated by a fearfully contagious and probably preventable plague. In a letter from America, we find on this subject: "Its contagious character seems to be confirmed beyond a doubt, though some of the veterinary practitioners deny it, which is almost as reasonable as it would be to deny any other well authenticated historic fact. Every case of the disease is traceable to one of two sources—either to Mr. Chenery's stock in Belmont, into which the disease was introduced by his importation of four Dutch cows from Holland, which arrived here the 23d of last May, [1859], or else to one of the three calves which he sold to a farmer in North Bloomfield, last June."

Secondly. Apart from the importation into countries, we have the certain proof, to which I drew special attention several years back, that cattle dealers' farms and public markets constitute the busy centres of infection. Most anxious and careful inquiries have proved to me, that in breeding districts, where the proprietors of extensive dairies, as in some parts of Dumfries, etc., abstain from buying, except from their neighbors who have never had the lung disease amongst their stock, pleuro-pneumonia has not been seen. There is a wide district in the vicinity of Abington, and in the parish of Crawford, which has not been visited by this plague, with the exception of two farms, to which market cattle have been imported and carried the disease.

Thirdly. In 1854, appeared, a Report of the Researches on Pleuro-pneumonia, by a scientific commission, instituted by the Minister of Agriculture in France. This very able pamphlet was edited by our esteemed friend, Professor Bonby, of Alfort. The members of the commission belong to the most eminent veterinarians and agriculturists in France. Magendie was President; Regnal Secretary; besides Rayer, the renowned comparative pathologist; Yvart, the Inspector General of the Imperial Veterinary Schools; Renault Inspector of the Imperial Veterinary Schools; Delafond, Director of Alfort College; Bonby, Lassaigne, Baudemont, Doyère, Mauny de Morny, and a few more representing the public. * * * *

The conclusions arrived at by this commission are two important to be overlooked here. I must refer the reader to the Report itself, if he needs to satisfy himself as to the care taken in conducting the investigations; but the foregoing names sufficiently attest the indisputable nature of the facts alluded to

In instituting its experiments, the commission had in view to solve the following questions:

1. Is the epizootic pleuro-pneumonia of cattle susceptible of being transmitted from diseased to healthy animals by cohabitation?

2. In the event of such contagion existing, would all animals become afflicted, or what proportion would resist the disease?

3. Amongst the animals attacked by the disease, how many, and under what circumstances? How many succumb?

4. Are there animals of the ox species decidedly free from any susceptibility to be affected from the contagion of pleuro-pneumonia?

5. Do the animals which have been once affected by a mild form of the disease, enjoy immunity from subsequent attacks?

6. Do the animals which have been once affected by the disease in its active form, enjoy such immunity?

To determine these questions, the commission submitted at different times to the influence of cohabitation with diseased animals forty-six perfectly healthy ones, chosen from districts where they had never been exposed to a similar influence. Of these forty-six animals, twenty were experimented on at Pomeraye, two at Charentonneau, thirteen at Alfort, and eleven in the fourth experiment at Charentonneau.

Of this number, 21 animals resisted the disease when first submitted to the influence of cohabitation, 10 suffered slightly, and 15 took the disease. Of the 15 affected, 4 died and 11 recovered. Consequently the animals which apparently escaped the disease at the first trial, amounted to 45.65 per cent., and those affected to 21.73 per cent. Of these, 23.91 per cent. recovered, and 8.69 per cent. died. But the external appearances in some instances proved deceptive, and 6 of the 11 animals of the last experiment, which were regarded as having escaped free, were found, on being destroyed, to bear distinct evidence of having been affected. This, therefore, modifies the foregoing calculation, and the numbers should stand thus:

15	enjoy immunity, or	32.61	per cent.
10	indisposed, or	21.73	"
17	animals cured, or	36.95	"
4	dead, or	8.98	"
46		100.27	

Of the 42 animals which were exposed in the first experiments at Pomeraye and Charentonneau, and which escaped either without becoming affected, or recovering, 18 were submittted to a second trial, and of these 18, four were submitted to a third.

Of the 18 animals, five had, in the first experiment, suffered from the disease and had recovered, five had never become affected, and four had been indisposed. The four animals submitted to the influence of contagion a third time, had been affected on the occasion of their first trial. None of the 18 animals contracted the disease during their renewed exposures to the influence of contagion.

From the results of these experiments, the commission has drawn the following conclusions:

1. The epizootic pleuro-pneumonia is susceptible of being transmitted from diseased to healthy animals, by cohabitation.

2. All the animals exposed do not take the disease—some rather slightly, others not at all.

3. Of the affected animals, some recover, and others die.

4. The animals, whether slightly or severely affected, possess an immunity against subsequent attacks.

These are the general conclusions which the commission has deemed itself authorized to draw, from their experiments. The absolute proportion of animals which become affected, or escape the disease, or of those which die and those which recover, as a general rule, cannot be deduced from the foregoing experiments, which, for such a purpose, are too limited. The commission simply states the numbers resulting from their experiments. From these, it transpires that 45 per cent. of the animals became affected with pleuro-pneumonia, and 21 per cent. took the disease slightly, making in the whole 66 per cent. which were more or less severely attacked; 34 per cent. remained free from any malady. The proportion of animals which re-acquired their wonted appearance of health amounted to 83 per cent., whereas 17 per cent. died.

Many minor points might be insisted on, but it will suffice for me to say, that the most careful analysis of all facts have proved to practical veterinarians, to experienced agriculturists, and must prove to all who will calmly and dispassionately consider the point, that pleuro-pneumonia is pre-eminently a contagious malady.

Symptoms.—From the time that an animal is exposed to the contagion to the first manifestation of symptoms, a certain period elapses; this is the period of incubation. The first signs, proving that the animal has been seized, can scarcely be detected by any but a professional man; though if a proprietor of cattle were extremely careful, and had pains-taking individuals about his stock, he would invariably notice a slight shiver usher in the disorder, which for several days, even, after the shivery fit, would limit itself to slight interference with breathing, detected readily on auscultation. Perhaps a cough might be noticed, and the appetite and milk secretion also diminish. The animal becomes costive, and the shivering fits recur. The cough becomes more constant and oppressive, the pulse full and frequent, usually numbering about 80 per minute, at first, and rising to upwards of 100. The temperature of the body rises, and all the symptoms of acute fever set in. A moan, or grunt, in the early part of the disease, indicates a dangerous attack, and the *alœ-nasi*, or nasal cartilages, rise spasmodically at each inspiration; the air rushes through the inflamed wind-pipe and bronchial tubes, so as to produce a loud, coarse, respiratory murmur; and the spasmodic action of the abdominal muscles indicates the difficulty the animal experiences, also, in the act of respiration. Pressure over the intercostal spaces, and pressing on the spine, induce the pain so charactertistic of pleurisy, and a deep moan not unfrequently follows such an experiment. The eyes are blood-shot, mouth clammy, skin dry and tightly bound to the sub-cutaneous textures, and the urine is scanty and high-colored.

On auscultation, the characteristic, dry, sonorous rale of ordinary bronchitis, may be detected along the windpipe and in the bronchial tubes. A loud sound of this description is, not unfrequently, detected at the anterior part of either side of the chest, whilst the respiratory murmur is entirely lost posteriorly, from consolidation of the lung. A decided leathery, friction sound is detected over a considerable portion of the thoracic surface. As disease advances, and the gangrene, with the production of cavities in the lungs ensues, loud rales are heard, which are more or less circumscribed, occasionally attended by a decided metallic noise. When one lung alone is affected, the morbid sounds are confined to one side, and on the healthy side the respiratory murmur is uniformly louder all over.

By carefully auscultating diseased cows from day to day, interesting changes can be discovered during the animal's lifetime. Frequently the abnormal sounds indicate progressive destruction; but at other times portions of the lung have been totally impervious to air, become the seat of sibilant rales, and gradually a healthy respiratory murmur proves that, by absorption of the materials that have been plugging the lung-tissue, resolution is fast advancing. I have seen some very remarkable cases of this description.

Unfortunately, we often find a rapid destruction of lung-tissue, and speedy dissolution. In other cases, the general symptoms of hectic or consumption attend lingering cases, in which the temperature of the body becomes low; the animal has a dainty appetite, or refuses all nourishment. It has a discharge from the eyes, and a fœtid sanious discharge from the nose. Not unfrequently it coughs up disorganized lung-tissue and putrid pus. Great prostration, and indeed, typhous symptoms set in. There is a fœtid diarrhœa, and the animal sinks in the most emaciated state, often dying from suffocation, in consequence of the complete destruction of the respiratory structures.

Post-mortem Appearances.—In acute cases the cadaveric lesions chiefly consist in abundant false membranes in the trachea and closure of the bronchial tubes by plastic lymph. The air vesicles are completely plugged by this material, and very interesting specimens may be obtained by careful dissection, in the shape of casts of the bronchial tubes and air vesicles, clustered together like bunches of grapes. On slicing the lungs in these cases, hæpatization is observed, presenting a very peculiar appearance, which is in a great manner due to the arrangement of the lung-tissue in cattle. The pulmonary lobules are a deep red or brown color, perfectly consolidated, and intersected or separated one from the other by lighter streaks of reddish-yellow lymph, occupying the interlobular areolar tissue. In the more chronic cases, the diseased lobes and lobules are found partly separated from the more healthy structures. This occurs from gangrene and putrefactive changes, or in some instances from the ulcerative process so constantly observed in the segregation of dead from living tissues. Abscesses are not unfrequently found in different parts of the lungs, sometimes circumscribed, at others connected with bronchial tubes, and not unfrequently communicating with the pleural cavity. True empyema is not often seen, but at all times the costal and visceral pleura are extensive, and there is much effusion in the chest. In dressed carcasses of cows that have been slaughtered from pleuro-pneumonia, even though the disease has not been far advanced, it will be found that the butcher has carefully scraped the serous membrane off the inner surface of the ribs, as it would be impossible for him to give the pleura its healthy, smooth aspect, from the firm manner in which the abundant false membranes adhere to it. The diseased lungs sometimes attain inordinate weights. We have them as high as 68 pounds.

Treatment.—The veterinary profession is regarded by many who have sustained heavy losses from pleuro-pneumonia, as deeply ignorant, because they cannot often cure this disease. Persons forget that there are several epidemics which prove equally difficult to manage on the part of the physician, such as cholera, yellow fever, etc. The poison in these contagious epizootic diseases is so virulent that the animals may be regarded as dead from the moment they are attacked. Its elimination from the system is impossible, and medicine cannot support an animal through the tardy, exhausting and destructive process of clearing the system of so potent a virus. All antiphlogistic means have failed, such as blood-letting and the free use of evacuants. Derivatives, in the form of mustard poultices or more active blisters, are attended with good results. Stimulants have proved of the greatest service; and the late Professor

Lessona, of Turin, strongly recommended, from the very onset of the disease, the administration of strong doses of quinine. Maffei, of Farrara, states having obtained great benefit from the employment even of ferruginous tonics and manganese in the very acute stages of the malady—supported by alcoholic stimulants. Recently the advantages obtained from the use of sulphate of iron, both as preventative and curative, have been extolled in France. It would appear that the most valuable depurative method of treatment yet resorted to, is by the careful use of the Roman bath. Acting like all other sudorifics in cases of fever and blood diseases, it carries off by the skin much of the poison without unduly lowering the vital powers.

Prevention.—The rules laid down in Denmark, and, indeed, in many other places, appear the most natural, for the prevention of the disease. If they could be carried out, the disease must necessarily be stopped; but there are practical and insuperable difficulties in the way of enforcing them. Thus, as Dr. Warncke says, prevention consists in "the avoidance of contagion; the slaughter of infected beasts; the prohibition of keeping cattle by those whose cattle have been slaughtered, during ten weeks after the last case occurred; the disinfection of stalls vacated by slaughtering; the closing of infected places to all passage of cattle; especial attention to the removal of the dung, and of the remains of carcasses of slaughtered beasts; and, finally, undeviating severity of the law against infringement."

Dr. Willems, of Hasselt, suggested and carried out, in 1851, the inoculation of the virus of pleuro-pneumonia, in order to induce a mild form of the disease on healthy animals, and prevent their decimation by severe attacks, due to contagion.

Dr. Willems met with much encouragement, and perhaps more opposition. Didot, Corvini, Ercolani, and many more, accepted Dr. Willems' facts as incontestible, and wrote advocating his method of checking the spread of so destructive a plague. The first able memoir which contested all that had been said in favor of inoculation appeared in Turin, and was written by Dr. Reviglio, a Piedmontese veterinary surgeon. This was supported by the views of many more. Professor Simonds wrote against the plan; and in 1854 the French Commission, whose report we have before mentioned, confirmed in part Reviglio's views, though from the incompleteness of the experiments further trials were recommeded.

Inoculation is performed as follows: A portion of diseased lung is chosen, and a bistouri or needle made to pierce it so as to become charged with the material consolidating the lung, and this is afterwards plunged into any part, but more particularly towards the point of the tail. If operated severely and higher up, great exudation occurs, which spreads upwards, invades the areolar tissue round the vetum and other pelvic organs, and death soon puts an end to the animal's excruciating suffering. If the operation be properly performed with lymph that is not putrid, and the incisions are not made too deep, the results of the operation are limited to local exudation and swelling, general symptoms of fever, and gradual recovery. The most common occurrence is sloughing of the tail; and in London, at the present time, dairies are to be seen in which all the cows have short tail-stumps.

Dr. Willems and others have gone too far in attempting to describe a particular corpuscle as existing in the lymph of pleuro-pneumonia. All animal poisons can be alone discovered from their effects. In structure and chemical constitution there is no difference, and often the most potent poisons are simple fluids. The Belgian Commission appointed to investigate the nature and influence of inoculation for pleuro-pneumonia, very justly expressed an opinion that Dr. Willems had not proved that a specific product, distinguished by anatomical characters, and appreciable by the miscroscope, existed in this disease.

The all-important question—"Is inoculation of service?" has, in my opinion, been solved. I cannot encroach, in the pages of this work, with the huge amount of conflicting evidence on the subject. The Belgian and French commissioners, Reviglio's, Simonds', Hering's, my own observations, and those of many more, prove, that a certain degree of preservative influence is derived by the process of inoculation. It does not arrest the progress of the disease. It certainly diminishes to some extent, though often very slightly so, the number of cases, and particularly that of the severe ones. This effect has been ascribed to a derivative action, independently of any specific influence, and indeed similar to that of introducing setons in the dewlap. I cannot speak very favorably of the latter process, as indeed I cannot recommend the inoculation of cattle. In London, some dairymen have considerable faith in this operation, though it is uncertain, and its *modus operandi* a mystery. I should counsel the keeper of dairy stock to select his own animals from healthy herds, and strictly avoid public markets. In many instances, to my knowledge, this has been sufficient to prevent the invasion of this terrible disease.

MILK FEVER.

Healthy cows, within the first ten days after calving, are seized with this fearful disease. It is of a protean character, in some cases consisting in apoplexy and paralysis, in others inflammation of the abdomen and womb, coupled with serious prostration; in others it is a fatal blood disease, assuming the character of typhus, but in reality consisting of purulent inaction, when inflammation of veins and deposits of pus or matter occur in different parts of the body.

The most prolific cause of all these diseases is over-feeding before and after a cow calves. The desire for a large supply of milk immediately after calving, often destroys the finest cow in a herd.

The premonitory signs of the malady are very few. Loss of appetite, wild look, staggering gait, obstinately lying, check to the secretion of milk, may all be observed, and are sufficient to alarm, and a veterinary surgeon should be immediately called in. No treatment can be guided by an inexperienced person in such a case. Perhaps the only means he should resort to, are mild purgatives and warm injections, with friction to the cold limbs, enveloping the body with cloths wringing wet, and then covering over with any amount of woolen cloths, etc. When the animal has thus steamed for three or four hours, the covering must be removed, the body rubbed vigorously, and dry clothing put on. Above all things, avoid strong internal remedies and bleeding.

RED WATER IN COWS.

The elements of blood occasionally appear in the secretions, most commonly in the urine, and sometimes in the milk. If pure coagulable blood passes from the bladder, it may certainly be ascribed to accident or disease of the kidneys, but independently of injury certain elements of blood transude with the elements of secretion. This is the case with that very common malady, *red water in cows.* * * * * In course of my investigation as to the cause of various cattle diseases, and red water in particular, I have found that it is unknown on well drained farms and in dairies where turnips are used only in moderate degree. The lands of poor people furnish the roots most likely to induce the disorder; and I can confirm the statement of the late Mr. Cumming, of Ellon, who in a very interesting essay on the subject, says, particularly in reference to Aberdeenshire, that it is "a disease essentially attacking the poor man's cow; and to be seen and studied requires a practice extending into the less favorably situated parts of the country. On large farms, where good stock is well well kept, and in town dairies, where artificial food is used to supplement the supply of turnips, it is now seldom seen."

Symptoms.—General derangement attract the dairyman's attention, and looking at the urine the cow has passed, it is observed to be of a reddish brown, or claret color, sometimes transparent, at others clear. The color increases in depth, other secretions are checked, the animal becomes hide-bound, and the milk goes off. Appetite and rumination are suspended, the pulse becomes extremely feeble and frequent, though, as in all debility or anæmic disorders, the heart's action is loud and strong, with a decided venous pulse or apparent regurgitation in the large veins of the neck. In some cases, if even a small quantity of blood be withdrawn, the animal drops in a fainting state. In red water the visible mucus membranes are blanched and the extremities cold, inducing the languid state of the blood's circulation, and the poverty of the blood itself. Constipation is one of the most obstinate complications, and many veterinary surgeons, knowing that if the bowels can be acted on the animal is cured, have employed purgatives in quantities far too large, indicating superpurgation, and even death. Occasionally diarrhœa is one of the first, and not an unfavorable sympton.

Post-mortem Appearances.—The emaciated body of a cow that has died of red water is throughout devoid of blood, the cavities of the heart itself are almost entirely empty, whilst the condition of the blood vessels would lead any one to suppose the animal had been bled to death. Frequently, as in other blood diseases, there are spots of extravasated blood or ecchymoses on the serous membranes, and particularly within the heart, beneath its inner lining or endocardium. Occasionally, the tissues of the body are yellow; the gall-bladder is often full of bile, and the large intestine is distended by dry, hardened excrement.

Treatment.—Large quantities of good linseed tea. Warm water clysters should be persevered with. If the discharge of urine be very abundant and very much discolored, half a drachm of powdered opium may be given twice, with an interval of six hours. The second day a bottle of linseed oil may be given. When the animal recovers, give her a complete change of diet. By all means avoid blood-letting, and indeed rather use stimulants than depressing agents.

BLACK WATER IN COWS.

This malady may consist in an aggravated form of *red water*, the urine being very dark in color; but there is a totally different disease which is known by the name of *black water*. It is the Wood-evil, Pantis, or Darn, of many districts in England and Scotland, and though far more severe in milch cows, it nevertheless affects oxen, and even horses. In Germany it is known by the name Holzkrankheit—Wood-disease—and in France as the Maladie des Bois.

Causes.—It has been believed due to the wild anemone by some, by others it is ascribed to the poisonous influence of *Lolium temulentum* [darnel], but my experience proves that it constantly occurs in pasture in the immediate vicinity of woods, where cows can partake of the astringent sprouts of young trees, especially of the oak.

Symptoms.—These are very similar to simple red water, but we sometimes find discharge of blood by the bowels. There is constipation at first, but diarrhœa towards the latter stage, generally colicky symptoms and evident indications of intestinal irritation. There is great tenderness over the loins; the urine is deeply tinged with blood, the general disturbance is very considerable, particularly when diarrhœa with hæmorrhage from the bowels sets in. The secretion of milk emits a bad odor, and is scanty in quantity. Occasionally convulsions occur, and the animal dies in from three days to a fortnight, in a state of great prostration.

Treatment very similar to red water, with recourse to active purgatives. Camphor may be used as a stimulant when the prostration is great.

BLACK QUARTER—QUARTER EVIL, BLACK LEG, ETC.

This disease, which I have rarely observed in aged cows, is very common in some districts amongst young stock. I remember but one instance in an aged cow amongst the numerous cases of other diseases in the London dairies.

Causes.—A healthy calf, if over-fed, thrives too rapidly, and makes blood too fast, rendering it imperative on the part of the keeper, to attend to moderation and regularity in diet. It may originate from contagion when once developed in some member of a herd.

Symptoms..—One of the first animals on a farm, bearing every appearance of blooming health, suddenly appears lame, and a fetlock, hock, or knee is observed swollen or painful; soon irritative fever sets in; the swelling extends upwards to the haunch or shoulder; the animal falls helpless to the ground, and unless destroyed dies within forty-eight hours; occasionally it lingers on in great pain for several days. The swollen extremity appears blueish or black where its color can easily be seen, and if incisions are made into it, black blood flows, which is seen to infiltrate and tinge the whole substance of the limb.

Post-mortem appearances.—These vary in importance, according to the severity of the case. The limb chiefly affected is gorged with semi-coagulated blood, and in parts with yellow lymph. The whole vascular system is distended by black, semi-fluid blood, and the flesh is of a dark color. The serous membranes all over the body, not excluding the arachnoid, are spotted with ecchymoses. Frequently the intestine gives evidence of a state of irritation during life—may be the seat erosions, but more usually of ecchymoses, as on the serous surfaces. The lungs are gorged with black blood.

Treatment.—This consists in the use of salines, such as Epsom salts, Glauber's salts, nitre, and any purgative, with restricted diet for a day or two. The salines should be given in small doses, such as four ounces of sulphate of magnesia three or four times in the course of twenty-four hours. When the animal has had a couple of pounds, it should be stopped. Nitre may be given regularly once a week, in ounce doses. The exhibition of mineral acids, of liquor ammonia acetatis, and recourse to the knife, in order to afford local relief, wherever painful swellings are formed, constitute the most apparent remedial means. Drainage [where the land requires it] and the periodical use of evacuant salines are the surest preventatives.

Black Quarter, in warm weather, and in hot climates, is attended with the development of a peculiar poison—the anthrax poison—which contaminates the flesh and blood of these animals, and is communicable to all warm-blooded creatures, giving rise to a very fatal disease, malignant pustule.

COW-POX.

This very simple affection is not often noticed, and so many forms of eruption are observed on the teats that it is somewhat difficult to detect the true from the false varieties of cow-pox, at certain stages of the eruption. The disease has claimed a very large share of attention from scientific men, from Jenner's discovery in the dairies in Gloucestershire, where he observed that the people milking cows having the cow-pox suffered from an eruption on their hands, but never had the malignant small-pox of the human being. This was the origin of vaccination.

The cow-pox, like other forms of variolæ, is a contagious pustular eruption of the skin, running a very regular course, accompanied by slight fever. It is communicable between animals of different species.

Causes.—The primary cause of cow-pox is unknown. The majority of cases occur in spring and summer, shortly after cows have calved. The state of congestion of the udder at this period favors the development of the disease, and it has never been observed to arise spontaneously in bulls, oxen or heifers before calving. It is chiefly seen in cows from four to six years of age. Mr. Ceely makes the following sensible remarks on the causes and origin of the disease. Referring particularly to the Vale of Alesbury, he says:

"The *variolæ vaccinæ* seems to have been long known in the Vale, and neighborhood. They have been noticed at irregular intervals, most commonly appearing about the beginning or end of spring, rarely during the height of summer; but I have seen them at all periods from August to May, and the beginning of June. By some it is pronounced that cold and moisture favor their development; by others, that the hard winds of spring after a wet winter, are supposed to have the same influence. I have, however, seen the disease in the autumn and middle of winter after a dry summer. The disease is occasionally epizootic, or prevalent at the same time on several farms at no great distance, more commonly sporadic, or nearly solitary. It may be seen sometimes at several contiguous farms; at other times one or two farms, apparently under like circumstances of soil, situation, etc., amidst the prevailing disease, entirely escape its visitation. Many years may elapse before it recurs at a given farm or vicinity, although all the animals may have been changed in the meantime; I have known it to occur twice in five years in a particular vicinity, and at two contiguous farms, while at a third adjoining dairy, in all respect similar in local and other circumstances, it had not been known to exist for forty years. It is sometimes introduced into a dairy by recently purchased cows. I have twice known it to be so introduced by milch heifers. It is considered that the disease is peculiar to the milch cow—that it occurs primarily while the animal is in that condition—and that it is casually propagated to others by the hands of the milkers. But considering the general mildness of the disease, the fact of its being at times in some individuals entirely overlooked, and that its topical severity depends almost wholly on the rude tractions of the milkers, it would, perhaps, be going too far to assert its invariable and exclusive origin under the circumstances just mentioned; yet I have frequently witnessed the fact that dry heifers, dry cows, and milch cows milked by other hands, grazing in the same pastures, feeding in the same sheds and in contiguous stalls, remain exempt from the disease. Many intelligent dairymen believe that it occurs more frequently as a primary disease among milch heifers; but I have not been able to confirm this remark by my own observation. It does not appear to be less frequent on the hills than in the vale. It has been seen primarily on the stall-fed as well as on the grazing animal.

Origin of the Disease.—I have met with several intelligent dairymen, whose relatives had seen good reason to ascribe its occurence to the contagion of the equine vesicle, communicated by the hands of the attendant of both animals; but very little of that disease has been noticed of late years, though I know of several farriers who have been affected from the horse, and resisted subsequent variolation or vaccination, and have seen a few who distinguish between equine vesicle and the grease, a recurrent disease—*eczema impetiginodes*—as it appears to me. For many years past, however, the spontaneous origin of the variolæ vaccinæ in the cow has not been doubted here. In all cases that I have noticed I never could discover the probability of any other source.

"There is much difficulty in determining with precision, at all times, whether the disease arises primarily in one or more individuals in the same dairy; most commonly, however, it appears to be solitary. The milkers pretend in general to point out the infecting individual; but as I have more than once detected the disease in a late stage on an animal not suspected of having it, I am not very prone to confide in their representations, unless my own inspection confirms or renders them probable."

Symptoms.—There are general symptoms of a mild fever, and the characteristic signs are purely local. The teats become painful and slightly swollen. In about three or four days, red, hard spots are seen, which soon appear circumscribed. They attain the size of a horse-bean, and milking becomes generally very painful to the animal. They rapidly increase in size and tenderness, and become charged with a limpid fluid, and are surrounded by a red base or areola. The limpid fluid becomes opaque and purulent, and the distinctive feature of the pustule is, that it has a depression on its summit. It is technically termed "umbilicated." It is most perfect about ten days after its first appearance.

Mr. Ceely has carefully examined the structure of the pustules, and finds the fluid enclosed in meshes, formed by fibres, which intercept the vesicle. A scab forms over the spot which is thrown off within the third week of the eruption.

Treatment.—From the great soreness of the teat, cows cannot readily be milked, and it may be essential to introduce in the milk-duct a tube, in order to draw off the milk. The udder requires to be freely fomented, and the animal should, in some cases, have a mild aperient. If the congestion of the mamma, be very considerable, and the gland becomes hard, a large linseed meal poultice must be applied, containing about a drachm of extract of belladonna. This should be kept on for several hours, and perhaps repeated. Supporting the udder is often useful, holes being made in the bandage used for this purpose in order to pass through the teats, so that the milk may be often withdrawn.

CHOKING.

This accident is very common in cows, and is usually due to a piece of turnip, a potato, or other large body. Sometimes a sharp-pointed object becomes fixed in the gullet, and at others, but seldom, in cattle, dry farinaceous food, imperfectly salivated, fills up the passage and chokes the animal.

Symptoms.—There are some general symptoms of choking which apply to all cases, and some special symptoms, dependent on the precise seat of the obstruction in the course of the gullet. The general symptoms are uneasiness, more or less difficulty in breathing, involuntary movements of the jaws, and flow of saliva from the mouth. If the animal drinks the liquid is ejected from the mouth and nose. Cows soon become hoven, and, indeed, the distension of the paunch by gas, which is so constant a symptom of choking, is the most serious complication, and calls for immediate relief. The special symptoms in the event of the obstruction being in the pharynx, consist in protruded head, abundant salivation, occasional spasmodic cough, great difficulty in breathing, haggard countenance and bloodshot eyes. By manipulation, either externally or through the mouth, the foreign object is detected in its true position. If the obstruction exists in the gullet, in its course down the neck, there is always a swelling on the left side indicating its presence. The symptoms are usually not so severe as in pharyngeal choking, with the exception of the swelling of the paunch. When the foreign object is lodged in that part of the œsophagus which runs through the chest, the general symptoms are not very urgent at first, and the most important special symptom is the animal drinking a little, indeed, as much as the œsophagus will contain, and then by a spasmodic effort, as if in the act of vomiting, the fluid being thrown back out of the mouth. This form of choking is more rare than the others, from the fact that the gullet widens as it approaches the paunch.

An accident incidental to choking, and occasionally due to the abuse of instruments in dislodging the obstruction, is laceration of the œsophagus, whereby the obstructing mass passes into the surrounding areolar tissue, and the animal then can swallow. If, however, it is allowed food, and especially of gruel or a sloppy mash, a considerable quantity passes through the lacerations into the pouch formed outside the gullet. An abscess may then form, and the materials gradually thrown out; but there is much danger attending this accident; the offending mass requires to be removed, and the wound afterwards treated on surgical principles.

In all cases of choking, give the animal a little water or oil. If the fluid be returned, try and remove the obstacle with the hand, if it exist in the throat. If, however, it has stuck lower down, the probang is used. It is hollow, in order to allow of the escape of the gas contained in the paunch, as soon as the latter is penetrated. In some cases a pair of forceps may be of service in withdrawing a piece of turnip, or other hard substance. The instrument should be used with great care. Sometimes a cow feeder has been known to pass the handle of his whip, or a stiff rope, down the gullet of a cow, to thrust onwards a bit of turnip. Care should always be taken not to lacerate the œsophagus, and sometimes with a little patience the obstacle is removed, without much interference on the par of the attendant on the animal.

In cases of obstruction in the cervical portions of the œsophagus, should the pressing down or removal of the mass prove impossible, œsophagatomy must be performed. The operation is very simple when the swelling produced by the obstruction is apparent, but it is much more difficult in cases of choking with the offending substance in the thoracic portion of the œsophagus, when it is essential to open the latter tube, and pass a flexible reed or probang down to push on the obstacle.

After choking, keep the animal on sloppy diet, and about ten days later, it is not uncommon to witness some unpleasant symptoms, and even a recurrence of the accident. This is due to irritation and ulceration in the œsophagus, which requires careful treatment. The animal must be allowed frequent draughts of tepid water, and should be drenched with thin gruel, in which a little tincture of myrrh may be advantageously poured. A blister should be applied along the throat, and laxatives may also be exhibited.

TYMPANITIS, HOVE OR BLOWN.

This condition, due to an accumulation of gas in the rumen or paunch, invariably occurs if the œsophagus be obstructed; but it is likewise seen under other circumstances, such as when cattle are fed on damp grass, or luxuriant clover; and indeed on any food which may ferment rather actively in the stomach.

The symptoms of tympanitis are a swelling on the left side of the belly, which, if struck, proves resonant, like a drum. The animal has a very anxious look, breathes heavily; and, indeed, suffocation is threatened.

In all these cases a stimulant should be given at once. The best is hartshorn, an ounce of which may be mixed with a quart of cold water and administered. This tends to neutralize the gas evolved in the paunch. Whiskey, or other alcoholic liquor, may be given in ounce or two ounce doses, but more reliance is to be placed on the neutralizing agents and evacuants; so that if the ammonia does not answer, a purgative must be given; and if several hours have elapsed, and the animal is still unrelieved, chlorinated water may be administered with advantage. Clysters should be used freely. If the case prove obstinate, and the animal's life be in danger, the paunch must be punctured with a trochea. This operation is performed by choosing a spot midway between the last rib and the prominent point of the paunch, or antero-inferior spine of the ileum, and about eight or nine inches below the transverse processes of the lumbar vertebræ; a small cut is made through the skin, and then the point of the trochea is applied to the wound, and thrust or stuck into the paunch, when the stilet is removed, and the tube allows the escape of gas, and admits of the introduction of liquid or medicines into the rumen.

There are chronic cases of tympanitis which consist in the recurrence of symptoms at intervals, and, indeed, daily, if the animal be fed on green food. This chronic dyspepsia or debility of stomach, may depend on lesions of the reticulum, and inability to ruminate. More commonly, however, it arises from a severe attack of indigestion, which, to a certain extent, paralyzes the stomach. Vegetable tonics, aromatics, and other stimulants should be used in all these cases, and artificial food should be resorted to.

IMPACTION OF THE RUMEN.

Similar symptoms to those of hove are witnessed when the paunch is impacted with food; but in these cases, by pressing with the hand into the side, an indentation is left, which gradually disappears. No drum-like sound is emitted on striking the side. The disturbance is often greater than in simple hove, and the animal appears weighed down by the overloaded stomach. Rumination is suspended and constipation exists. The latter symptom may be removed, and yet the rumen remains unchanged. Copious draughts of tepid water, and the injection of the latter by the stomach pump, in order to dislodge the solid mass, and clysters are of service in favoring the peristaltic movement of the whole intestine. Stimulant and laxative remedies are occasionally of service. If a purgative does not answer in such a case, the paunch has to be opened.

DISEASES OF THE RETICULUM.

The second stomach, the reticulum, or honeycomb-bag, participates in the morbid conditions peculiar to the rumen, and it is very often observed the seat of any important disease. Concretions are apt to form in it, by the uniting of hair into the shape of round balls, and in some instances cows swallow dirt and many strange bodies, which are apt to become fixed in the meshes of the reticulum. Needles, nails, bits of wire, etc., are frequently swallowed by cows, and they become fixed in the second stomach, afterwards finding their way through the sides of the body, but more frequently pushing forward into the chest and through the heart, which may be punctured and the animal destroyed. The presence of these foreign objects is rarely discovered during life.

When cows swallow irritant poisons, they are apt to accumulate in the reticulum, and the latter becomes inflamed, giving rise to very serious disturbance. Ulceration of the reticulum has been seen under these circumstances, and a fistula formed, so that most of the material an animal swallowed dropped out through the abdominal walls, and as a necessary result the cow became emaciated, and was destroyed.

VERTIGO—STOMACH STAGGERS.

The third stomach, manyplies or omasum, is apt to become impacted with food, usually with rich grass, and the cow may continue to eat voraciously for a while, but suddenly stops, has a wild, haggard look, lifts her head, trembles, foams at the mouth, and if loose, dashes at full speed forwards until stopped by a paling or wall, or falls, striking its head on the ground, rolling on its side, and for a few moments convulsively contracting its limbs. The symptoms are sometimes very violent, and the animal dies within a very short time.

Treatment in these cases consists in applying cold water to the head, and giving a pound and a half of sulphate of soda in solution. This should be followed by ant-acids, such as carbonate of soda, and small doses of chalk. All food should be removed from the affected animal. Linseed oil may occasionally be given to it, and injections freely resorted to.

CACHEXIA OSSIFRAGA—THE STIFFNESS—THE CRIPPLE.

The Germans have given the name Lecksucht or Schlecksucht, which means inordinate desire to lick, to a disease of cows, which consists in morbid appetite, and an irresitible propensity to lick, particularly alkaline or saline substances. The most extraordinary objects, such as clothes and stones, are sometimes swallowed by cows in this state.

The causes of this affection are various; occasionally it occurs as enzootic or epizootic, spreads far and wide, seizing chiefly weak, pregnant, or abundant milking cows. It is seen in winter, and when food is poor and bad. It is also common during wet seasons, and in marshy districts.

Symptoms.—At first the appetite is simply diminished, or a desire is evinced for dirty straw, dung and other filth. The animal's coat stares, there is a mucous discharge from their eyes and mouth; the dung is dry and covered with mucous. The secretion of milk appears almost increased at first, but soon diminishes; is very watery, blueish, and contains no cream. The cow licks up lime, and even clay. At this stage a cachectic state is induced, which is characteristic of the disease. The animal anæmic, the heart action is loud and strong, the pulse frequent and feeble, rheumatic symptoms appear, and the cow becomes stiff, evidently suffering from pains in the joints, and growing progressively weaker. The joints swell, and the tissues of the body waste; the bones grow friable and break, or the limbs become paralyzed. This disease has also been termed "Cripple," "Fragility of Bone," etc., but the changes in the structure of the osseous system are evidently secondary to the gastric disturbance.

After death the body appears much emaciated; poor, watery blood imperfectly fills the vascular system. Mucus abundantly coats the mucous membrane of the alimentary canal, and often worms are found in the stomach. A very watery fluid, of a peculiar sour odor, exists in the alimentary canal. Various tissues are soft and dropsical; the bones are soft, enlarged in parts, fragile, and at the seat of the spontaneous fractures are stained with blood, and crumble on the slightest pressure.

Treatment.—Change of food and change of situation are of most service. Salts of lime and potash, with bitter tonics may be given. Water acidulated with sulphuric acid should be allowed as a beverage; rock salt kept before the animal to lick, and with highly nutritious food, small doses of sulphate of iron may be given. Rychner recommends preparations of iodine internally, particularly when there are rheumatic complications.

[This malady appears to be similar to what is known in some of our Eastern States as the "Bone-Disease." Its subjects are milch cows which are kept on poor land. It has been very troublesome in some parts of New Hampshire, on cold, "run-out" pastures. Some persons believe it to result from the exhaustion of phosphates in the soil. As a remedy, "bone meal" has been administered with good results. The article is prepared by button-makers; clean bone, having no disagreeable odor, being ground about as fine as corn meal that is used as cattle feed. Animals affected with the so-called bone-disease will frequently eat this bone meal voluntarily, and are permitted to eat half a pint a day for several days in succession. When it is wished to administer the bone meal to animals that will not eat it by itself, it is mixed with corn meal or shorts. The advantages which are thought to result from the use of bone meal, in this disease, are such that the article is sold in considerable quantities at the agricultural stores in eastern cities.—S. H.]

DIARRHŒA.

Cows are often subject to looseness of the bowels, and particularly if turned out on soft, wet pasture, with young grass. This, however, is a simple form of diarrhœa which is checked by allowing the animals hay or other dry food. Obstinate forms of diarrhœa may result from either of the following causes: 1. Indigestible and irritant food. 2. Derangement of the system, leading to imperfect secretion of gastic juice, and consequent passage of undigested food into the intestine. 3. The presence of a poison in the blood, which nature eliminates by the excreting organs. 4. From the mucous membrane of the intestine becoming habituated to free discharge, from any of the foregoing causes.

The symptoms of diarrhœa are too commonly known to need any lengthened description. I must mention, however, that the condition of the fœces chiefly indicate the cause of the diarrhœa, and when the cause is constitutional there is usually great fœtor of the excrement, and great prostration of the animal affected.

Treatment.—In the first variety the best remedy is low diet and a purge; in the second, low diet, the use of carbonate of soda given with food, or giving an artificial gastric juice prepared with the rennet of the calf. Ant-acids are of great service, and the intestine must be kept clear of irritant substances by clysters. In the third variety of diarhœa, the constitutional state has to be treated according to circumstances. In the fourth variety, farinaceous foods, starchy principles, astringents, such as chalk, catechu, lime, opium, and other similar substances, are employed.

DIARRHŒA IN CALVES.

This malady destroys thousands of calves annually. It is a disease which depends on the weak constitution of the young animals, and the inappropriate nature of the milk given to them. The milk may be very good, but instead of the young creatures being allowed to suck, it is made to drink large quantities of cold milk at long intervals, such as at morning and at night. In some districts sucking calves have the malady, but this depends on not being allowed to suckle their own mother, or the cows being fed on improper food, and their milk becoming unfit for their calves. The disease has been supposed by some contagious, but it is not, though many young animals die simultaneously.

Symptoms—Voracious appetite, languor, abdominal pain, tendency to swelling of the abdomen, frequent discharges of fœtid flatus and yellowish or white excrement, which is the unchanged milk drank by the animal.

Treatment.—Clysters; a little chalk or wheaten flour in the milk; small doses of calcined magnesia or carbonate of soda, particularly if there is any tendency to hove; the best remedy is the common rennet, a tablespoonful of which may be given after the calf has taken a little milk, and thus aiding the natural action of the stomach.

PARASITIC DISEASES OF THE LIVER.

The parasite called fluke,—*Distoma hœpaticum*,—abounds in the livers of cattle under a variety of circumstances, and induces a weak and dropsical condition of the system, termed *cachexia aquosa*, and generally known by the name of Rot.

Rot is an affection more commonly seen amongst sheep than cattle, and it is almost unknown amongst the latter in Great Britain, but it is the cause of very serious loss on marshy lands on the continent of Europe.

The parasite, which belongs to the order of the *Trematode* or sucking worms, is subject to various metamorphoses, being met with in the liver only in its completely developed state, surrounded by an abundant deposit of eggs. Those pass out of the body and undergo a stage of development in other animals, probably mollusca, which exist in myriads in damp pastures, and find their way with the herbage into the stomachs of cattle. Probably the watery and innutritious condition of the grasses grown on damp pastures favors the anæmic and dropsical condition, and it is only when the system has suffered that the parasites multiply without limit in the gall ducts. Indeed, the fluke is not the only parasite which preys on animals subject to the debilitating effects of pasturing on boggy lands. The *Filaria lachrymalis,* a small thread worm, lodging in countless numbers in the eye-socket is seen leisurely crawling over the delicately sensitive and transparent structures of the globe, without apparently inducing any pain or inconvenience. *Ascarides, Strangyli,* not excluding animal and vegetable parasites on the skin, multiply with almost incredible rapidity in systems thus undermined.

Symptoms.—Amongst a herd of cows on low, damp ground, some are observed to thrive better than others; their skin is sleek and the forms rounded by an ample subcutaneous deposit of fat. These animals, however, soon indicate languor and torpidity, which increases, and a rapid change in condition occurs. The skin and visible membranes become pallid, the body wastes, the eyes become sunken, and not unfrequently a hollow cough sets in; the limbs occasionally swell, and sometimes seem to distend the connecting tissue beneath the chest and belly. Cows in milk yield a thin, watery secretion in spare quantities ; they soon become very helpless and scarcely able to stand. The appetite continues, however, until within a short time before death. The signs of an approaching fatal end are accumulations of fluid round the throat, in the chest and belly, with great predisposition to derangement of the digestive organs, diarrhœa, and total failure of strength, so that the animal droops and slowly dies. The progressive emaciation, notwithstanding the most careful treatment, is characteristic of the condition already described, and termed "hectic."

Post-Mortem Appearances.—These consist in all the signs of wasting of the tissues. Displacement of fatty matter by yellow serum, which distends the fat cells, particularly round the kidneys. A yellow turbid serum exists all over the body, indicating the dropsical condition of the animal during life. The parasites above mentioned are found in the organs they usually inhabit, particularly the fluke or *Distoma hœpaticum,* which plugs the hepatic ducts, distending these into pouches. The ducts are occasionally encrusted by calcareous and biliary principles, so that by a little maceretion, perfect casts of the diseased biliary ducts are obtained. All the pouches or cul de sacs formed along the curves of the tubes are occupied by flukes and their ova.

Treatment.—Removal to a dry, sound pasture. Exhibition of common salt in food, and tonics, both vegetable and mineral, but particularly the latter. Sulphate of iron is probably the most useful preparation to administer. And, if possible, cows should be allowed water impregnated with iron, which is readily obtained from a smith's shop, by using that in which much iron has been cooled.

TUBERCULAR CONSUMPTION.

In certain conditions of the system, both in man and the lower animals, the lymph, which in a normal state nourishes the tissues, is thrown out in large quantities, unfit for the purposes of nutrition, and becomes plastic. It accumulates in masses in certain parts, undergoing but very slight development, remaining for an indefinite period as a solid unchanging substance, and having a tendency to degenerate. The degeneration consists in liquefaction, and in others in a fatty or calcareous transformation ensues. In man the tubercular deposition occurs chiefly in the substance of organs, and particularly in the substance of the lungs. In the cow it is chiefly seen beneath and in connection with the serous membranes. Large masses accumulate beneath ihe costal pleura, over the diaphragm, and in different parts of the peritonæum. The omentum is often the seat of a very extensive deposition of tubercle. Tubercular matter accumulates in circumscribed deposits, varying in size from the head of a pin to a hazel nut. Many of these flattened or rounded tumors, joining to form a very voluminous and slightly vascular mass, which by increasing in size compress the lung and induce considerable derangement.

Cause.—Hereditary taint is not always so obvious a predisposition in the lower animals as in the human subject. Nevertheless, cows, with a well marked tubercular diathesis, give birth to calves possessing a similar constitutional tendency. It is a peculiar disease induced by conditions affecting the milk cow. It prevails most amongst aged animals, and generally amongst abundant milkers. It is associated, or it may be the cause of irritation of the ovaries, inasmuch as most of these animals are "bullers," or affected with nymphomania. It appears to me that this complication arises often from an imperfect development of the ova in the ovaries, and cysts periodically form without maturing the ovule. This imperfect action may essentially depend on the weakened state of the constitution, and the aplastic nature of the material usually destined for nutrition.

The symptoms of the disease are in the early stage simple cough, with dainty appetite, dullness, weak pulse, though loud heart-beats, as in anæmia. Emaciation sets in, the animal becomes hide-bound, its coat stares. The cough is peculiarly oppressive at times. The lymphatic glands of the body are not unfrequently swollen, and the seat of tubercular deposition. Their enlargement is observed in the maxillary, and towards the cervical regions. Cows with this disease stand obstinately with an arched back and dejected look. They yield often a large quantity of blue watery milk, and from this circumstance they are often retained in dairies till a period when the disease is very far advanced. Discharge by the eyes and nose, with diarrhœa, and a fatal hectic, constitute the concluding features of this deadly and lingering malady.

Treatment.—Animals with this disease require food rich in starchy and fatty principles. Linseed cake, oils, and easily digested meals, often effect more good than medicines which may be employed. Ferruginous tonics are of use, given cautiously, and by careful nursing the condition of the animal may be much improved, and its life considerably prolonged.

ABORTION.

Amongst valuable stock and in extensive dairies, we not unfrequently find that if one cow aborts, a number soon follow. This has been attributed to sympathy, and abortion has in a sense been regarded as contagious, but the real cause of the concomitant abortions in different animals, is operating alike on all, and the more susceptible first suffer, and then those that are least so. I think I cannot do better than to reproduce here a short but most interesting article on this subject, which Professor Tanner, of Birmingham, contributed to the first volume of the Edinburgh Veterinary Review.

"This is a peculiar form of disease, which occasions considerable loss to the breeder of stock. Some seasons are very much worse than others, and some districts are remarkably liable to it. Its importance is manifestly great, from the number of calves which are lost, but this does not reveal the full loss; for the heifer or cow is injured as a *breeding* animal. This is a loss which few can fully estimate, especially when it occurs in first-class herds; for, as I have elsewhere shown, we must not value breeding animals simply as producers of their own weight of meat, but as the communicators of hereditary characters; which render them of *very* much greater value. Unfortunately, we find these losses prevailing amongst our high-bred stock much more freely than in any other class; indeed, we often notice common-bred cows exposed to similar influences — frequently forming part of the same herd, and treated in the same manner—yet, whilst those of inferior breed escape, the high-bred stock suffer. This is, doubtless, referable to the naturally weak condition of the breeding organs in all high-bred stock, rendering them more susceptible of exciting influences.

"I shall not go into any notice of the general subject of abortion, but rather restrict my remarks to a cause which is very much overlooked, and yet is probably more influential than all other causes combined. I refer to the growth of ergotised grass-seeds in our pastures. The action of ergot of rye (*Secale cornutum*) upon the womb is well known as an excitant to powerful action, which usually terminates in the expulsion of the fœtus. We have a similar disease appearing on the seeds of our grasses, but especially on the rye-grass, and thus we have an ergot of the seed of rye-grass produced, possessing similar exciting powers upon the womb to those produced by this ergot of rye. Two conditions are necessary for the production of this ergot upon the seed of rye-grass. The first is, the grass must be allowed to run to seed; and the second is, that the climate must be favorable for encouraging the development of the ergot. In practice, we find that on land which has been fed on during summer, unless it has been grazed with unusual care, much of the grass throws up seed stalks, and produces seed. In districts where the climate is humid, and rain abundant, as well as in very wet seasons, these seeds become liable to the growth of this ergot. [It may be well to observe that ergot occurs not unfrequently in the grasses growing in the pastures and meadows of America. In wet seasons it is sometimes abundant in June-grass, blue-grass (of Kentucky)—*Poa pratensis*—also in timothy, or herds-grass (of New England)—*Phleum pratense*—and in witch-grass, or couch-grass—*Triticum repens*, etc.—S. H.]

"Cattle appear to eat the ergotised grass with a relish, and the result is, that abortion spreads rapidly through the herd. Heifers and cows, which, up to the appearance of the ergot, have held in-calf, are excited by consuming it in their food to cast their calves. The abortion having once commenced, we know that the peculiarly sensitive condition of the breeding animal will cause its extension, even where the original cause may not be in operation, but their combined action renders the loss far more serious. If we add to this the tendency which an animal receives from her first abortion to repeat it when next in calf, we see how seriously the mischief becomes multiplied.

"A somewhat extended observation, added to my own experience, has led me to the conviction, that very much of the loss arising from abortion in our cows, may be traced to the cause I have named. I feel assured the influence is even more extended than I have stated; for not only would the fœtus be thrown off in an advanced stage, but also during its earliest growth, thus causing great trouble to breeders of high-bred stock—the repeated turning of to cows the bull, and at most *ir-*

regular intervals. The remedy differs in no respect from the ordinary mode of treatment, except that it compels a removal of of the stock from the influence of the cause. Much, however, may be done by way of prevention, and this I shall briefly notice. It simply consists in keeping breeding cows and heifers upon land free from these seeds."

[In this country cows more frequently abort while being fed with hay than on grass; and on the supposition that ergot is the cause, care should be taken not to feed hay which contains it. —S. H.]

MAMMITIS, OR GARGET.

The absurd process of hefting [letting the cow go a long time without milking] is not unfrequently the cause of mammitis, and particularly when a cow-dealer, in order to show a cow well off, feeds her very highly, and causes a very abundant secretion, of which he does not relieve the poor animal.

The udder appears much congested and red, with prominent teats, jetting forth the milk at every step the animal takes. The cow being milked is for a time relieved, but she is observed not to feed so well, to shiver and grow dull. The udswells, and becomes so tender that the milk secreted is not removed. In this early stage the disease is readily treated; but it is usually overlooked, and soon one or more quarters of the udder become firm, hard, and much swollen. No secretion follows, and if the inflammation runs very high for a time, an abscess forms, which is indicated by a circumscribed, hard and hot swelling, in which there is soon decided fluctuation. In other cases the udder becomes and remains simply indurated. The abscess discharges its contents by pointing through the skin, or opening into the milk ducts. In the latter case the pus is observed in the milk, and often blood with it.

Treatment.—In the early stage, a purgative, and abundant warm fometations to the udder. If the tension be great, the udder must be supported, and a large linseed-meal poultice should be applied, with a drachm or two of extract of belladona in it. If there be any tendency to chronic induration, an active stimulating embrocation must be applied at intervals, with considerable friction. If abscess forms it must be opened and the teat-tubes must be used to draw off the milk.

RETURNS FROM AGRICULTURAL SOCIETIES.

In regard to the proceedings of such Agricultural Societies as have made returns for the year 1864, it has been deemed inexpedient to publish details. Many of the returns consist chiefly of a list of the premiums awarded at the shows, with the names of the successful competitors. As these were generally published in the districts where the shows were held—where only they are regarded with special interest—it seems unnecessary to reissue them. In instances where societies have transmitted information relating to the condition of agriculture in their respective districts—as in the case of the societies of Genesee and Calhoun counties—it has been thought proper to preserve its substance.

BARRY COUNTY.

The twelfth annual show of the Barry County Agricultural Society was held on the grounds of the Society, at Hastings, October 12th and 13th, 1864. Number of entries for premiums, 254. Number of members, 160. The receipts and expenditures of the Society, for the year, are stated as follows:

Receipts.

For memberships,	$160 00
" tickets,	131 00
" cash balance of 1863,	16 00
	$307 00

Expenditures.

For printing and holding show,	$ 68 33
Premiums awarded,	121 39
For village lot,	40 00

Recording deed, $2 00; taxes, $8 40,	10 40
Balance in treasury,	66 88
	$307 00

Officers.—Gilbert Striker, President; J. M. Nevins, Secretary; H. N. Sheldon, Treasurer.

CALHOUN COUNTY.

The annual exhibition of the Calhoun County Agricultural Society was held on the grounds of the Society, at Marshall, from the 5th to the 7th of October, 1864. Although the weather was, for the greater portion of the time, very unfavorable, the exhibition was highly creditable, and fully sustained the reputation which the county enjoys in regard to the character of its agriculture. The annual address was delivered by Sanford Howard, Secretary of the State Board of Agriculture.

Receipts for the year are stated at	$1,598 25
Expenditures,	1,255 42
Balance in the treasury,	$342 83

Officers.—Charles P. Dibble, President; Samuel S. Lacey, Secretary; Charles T. Gorham, Treasurer; with an Executive Committee consisting of five members.

The evenings, during the time of the exhibition, were devoted by the Society to the discussion of agricultural subjects—a course which has for several years been followed, with very satisfactory results, by some societies in the Eastern States, and which it is to be hoped may be generally introduced here. Special papers were brought out on various topics, and these formed the basis of the discussions. The evenings were thus very pleasantly and profitably spent, and the matter elicited was of a character worthy to be preserved as a portion of the transactions of the Society. Among the papers produced on this occasion, was the following, by the Hon. Samuel S. Lacey, of Marshall, on the cultivation of wheat:

CULTIVATION OF WHEAT.

Wheat has been cultivated as an article of domestic use, and of commerce, as far back in the dim past as history extends its researches. As a market product and medium of exchange, it holds an important place, when taken in connection with all the other products of farm labor. Our soil and climate are admirably adapted to its growth. Our white wheat, and the flour manufactured from it, for excellence of quality, stands in the great marts of the world the equal of any. It has a reputation which may well constitute the farmer's pride. Our marketing facilities are unsurpassed.

We easily perceive then, that, with our advantages of soil and climate, and our access to the best markets of the world, the cultivation of wheat presents a question of grave importance to the farmers of this county—perhaps only equalled by the consideration as to how our present average production shall be maintained and increased, and the soil preserved from that exhaustion which has befallen many portions of the Atlantic States, formerly the great wheat producing States of the Union.

It has been impossible for me to obtain and present such full and accurate statistics, in regard to the wheat crop in this county since its organization, as will show the annual product per acre. In 1840, with a population of 10,599, we produced 176,630 bushels of wheat, and 140,971 bushels of corn, of the aggregate value of about $140,000—or $14 for each inhabitant. In 1845, with a population of 15,595, we produced about 280,000 bushels of wheat, and nearly the same quantity of corn. In 1850, with a population of 19,162, we produced 385,959 bushels of wheat, and 327,544 bushels of corn, of the aggregate value of $298,084 20. In 1854, with a population of 22,768, we produced 480,649 bushels of wheat, which was grown upon 39,000 acres, the average being about 12 1-3 bushels per acre. In 1860, with a population of 29,368, we produced 692,804 bushels of wheat, and 612,109 bushels of corn. In 1864, with a population of 30,486, we produced 835,583 bushels of wheat, on 56,492 acres of land, or an average of 14 8-10 bushels per acre (nearly), and 528,338 bushels of corn on 19,118 acres, the crop having been injured badly by the frost of August.

The aggregate value of the wheat and corn crops of 1863, did not fall far short of $1,500,000, which with the probable value of the wool just marketed ($500,000), will make the grand aggregate for these three great staples, of $2,000,000, or an average product per inhabitant of about $64, which certainly compares favorably with the average in 1840.

These statistics lose somewhat of their value, because we cannot get the annual average per acre, except for the years 1854 and 1864, which enables us to determine, that the average of the latter crop execeeded that of the former by 2½ bushels per acre. We therefore assume for this occasion, as we believe the facts warrant, that this increased average resulted from *improved cultivation*, and not from accident.

But, it is submitted, that the farmers of this county, and members of this society should never remain content until their average crop shall reach at least 20 bushels per acre, weighing 64 lbs. per bushel. It is well known that very many members of our society, have for some years past, produced an average crop of 20 bushels per acre, but this only the more distinctly demonstrates the fact that another, equally as large a body of our farming community, produce much less than the average, and consequently are laboring for very inadequate compensation. It is for the benefit of this class that our exertions as a society should be directed. There is not a rational doubt that intelligent labor, applied to the cultivation of wheat, will enable our farmers to grow an average crop of 20 bushels per acre, and keep their lands constantly increasing in fertility. By intelligent labor, is meant labor guided by experience and close observation, controlled by the exercise of sound judgment and skill in adapting crops to soil, and such rotations in cropping as shall keep the land constantly enriched. It includes, also, system, without which no one can hope for continued success in the business of farming, any more than in the most intricate business pursued.

The object with the farmer must not be so much the quantity of land cropped, as how he can succeed in producing five bushels of wheat and twenty bushels of corn per acre more than the last year, and what system of cropping he shall adopt to increase the natural productiveness of his land. These are questions which we must ponder well and decide wisely, or our children shall succeed only to a worn-out heritage.

Wheat requires deep, clean tillage. When the fallow is employed, the plowing should be deep and thorough—8 to 10 inches, and well turned. The object of fallow cultivation is threefold: 1st. To increase the depth of soil available for the growth of the crop.

2d. The complete pulverization and mingling of the elements of the soil.

3d. The utter destruction of weeds or grass. Upon our loamy and sandy-loam soils, once plowing is found, ordinarily, to be best, leaving the after preparation for the harrow and cultivator, or gang plow.

Both experience and observation show, most conclusively, that the proper office of the harrow is very imperfectly understood, and not at all appreciated by large numbers of our farmers. To be effective, it ought to follow close after the plow, and not with the simple object of levelling the surface, but it should be repeated as often as is necessary to produce a thorough pulverization of the soil. Of course, the harrow must be followed by the cultivator or gang plow often enough to subdue all weeds or grass.

If barn-yard manure, or a large growth of clover is to be turned under, the plowing should be as early as possible, and the crop will be greatly benfited by the immediate use of the roller and the harrow. This treatment will close up the surface, and promote rapid fermentation and decomposition.

If wheat is to be sown after corn, and the soil has been thoroughly fitted for the crop and properly cultivated, (and no others should be sown), the plowing should be shallow, always bearing in mind the well-known fact that *wheat thrives best,* *reaches the greatest perfection, and yields best upon a compact soil,* and that a crop is often fatally injured, if not lost, by too great looseness of the soil.

Every farmer will convince himself of this fact, by observing his head-lands, or spots where cattle and sheep have trampled the earth so hard as to make it difficult to properly cover the seed.

With a stiff, tenacious clay, of which we have but very little in this county, a different mode of cultivation, where the plow and harrow, by repeated use, must do the work of pulverizing and fitting the soil for the seed, must be adopted.

Second in importance, is the choice and preparation of seed. Too little attention is bestowed upon this part of the crop. It is not possible, within the limits assigned to this essay, to discuss the questions affecting the comparative value of the numerous varieties of wheat, which climate, soil and cultivation have produced. The object of the farmer should be, to ascertain the kind of wheat best adapted to his soil, and then seek to improve it with the same care he does his flock of sheep, his swine, or his cattle.

To this end every farmer should prepare a few acres, with especial reference to his seed; it should be manured and fitted with as much care as the plats in his garden. He should carefully remove by hand every spire of chess, or cockle, and when the crop is *fully ripe,* should cut and secure it in the barn separate from his general crop. The seed should be threshed with a flail or with horses, and not with a machine, cleaned perfectly, and dressed with lime, or strong brine, before being sown.

Seed prepared by this process, will produce a strong and vigorous plant, which will successfully defy drought, insects, or the frosts of winter, when sown on properly prepared soil.

It would require altogether too much time to attempt an argument as to the best manner of applying manure to a wheat crop. It has been generally held best to spread it upon the fallow and turn it under by the plow; but some recent experiments in top-dressing have resulted in astonishing success. It is the part of wisdom to try both, for a series of years. A well-conducted series of experiments will determine this question, and be worth more than all the speculation that can be offered.

There are two modes of sowing wheat practiced in this country —broadcast and drill. The condition of the land—new, stony, rough and stumpy land—make broadcast-seeding the only practicable way; but experience and observation teach that, when the drill can be used, it is both wisdom and economy to employ it. Reason affirms what observation teaches to be true, in this respect.

Experiments have been made, which proved satisfactorily, that wheat geminates best when buried at the average depth of one to two inches; that of seed buried less than one inch, and more than two inches, less than one-half germinates, while of that buried between one and two inches seven-eighths grew.

Another strong reason for the use of the drill arises from the nature of the growth of the plant itself. Wheat, in its growth from the seed, forms three kinds or systems of root, two of which perform the important part in maturing the crop. The first is, the germinal or tap root, which proceeds from the germ of the seed, whose office is to fix the plant in the soil and yield it support until the side or coronal roots are formed. The second system of roots, when the seed is properly buried, form just beneath the surface of the ground, and are the chief channels of the nourishment, upon which the future growth and perfection of the plant depends. Upon the strength and vigor of these roots, depend the strength and vigor of the future plant.

When wheat is sown broadcast, these side, or coronal roots, lie near to the surface, and are thus exposed to the hostile action of the frost. They are not only liable to be broken and sundered by the frequent freezing and thawing of early spring, but often are wholly exposed by the dry cold winds of March and April, and in either case the plant is shorn of its strength—it can only struggle along and live—without the power to promote the important process of tillering and spreading, and thus a short crop is the result.

By drill planting, these dangers are avoided. The drill plants the seed at a very uniform depth, regularly, which secures its germination, leaving a slight ridge of finely prepared soil, on each side the plant, into which the side root finds its way and takes deep, strong hold. This ridge protects the root of the tender plant, and the plants crowding in upon each other, in continuous rows, spread their kindly branches about and over each other, thus giving shelter and protection against the drought, the frost, or the winter's blast. Thus the drill-seeding secures the growth of the greater quantity of seed and performs a very important office in relation to its future growth

The best time for seeding in this county is believed to be from the 8th to the 20th of September. Spring harrowing has not been practiced to any great extent in this State, but it has been found to produce very marked benefits in various parts of New York and other Eastern States, where it has been adopted. There cannot exist any reasonable doubt that the practice will be found successful here. The harrow should be light, used when the surface is dry, and the clover seed may follow with every prospect of success.

In regard to the proper time for cutting the market crop, it is believed there is but little difference of opinion—it should be when the grain is in the dough, if we desire the heaviest wheat per bushel, and that which makes most profit to producers and manufacturers. The only deviation from this rule, is in respect to seed wheat, which should be *fully ripe*, when cut.

In the views thus imperfectly presented, I have fulfilled the limits assigned myself in the discussion of this important subject. But there is intimately connected therewith another subject, which I desire merely to suggest for your consideration, and that is, a systematic rotation of crops, having for its object the permanent improvement of the soil. For the purpose of illustration, let me suppose the farm divided into four fields, Nos. 1, 2, 3 and 4. Next spring, spread all the manure accumulated upon lot No. 1; plow it thoroughly, and plant it with corn and such other crops as will give place to wheat in the fall.

As this system discards the fallow as much as possible, the farmer will have ample time to cultivate his corn, shear his sheep, cut his hay, and harvest his wheat, without the constant dread of the sun upon his summer fallow. If the corn has been planted early and properly cultivated, it may be cut up, removed to the adjoining field, and the land sowed with wheat by the 20th of September.

In the spring following, let the light harrow follow the paths left by the drill; then sow the clover-seed and the plaster, and the work is done until harvest.

The next year, lot one will give the farmer an abundant crop of hay and seed; the third year in pasture, which fits it for the plow again.

This system contemplates only one plowing for corn, one for wheat, and when fairly inaugurated the fields would be occupied as follows: No. 1, corn; No. 2, wheat; No. 3, meadow; No. 4, pasture; three-quarters of your farm producing crops each year, while one-quarter only is plowed—the same crop being repeated only once in four years.

This system is not offered as original; it has been fully elaborated by men of very great experience in agricultural pursuits, and advocated as a system not only well calculated to preserve and increase the natural fertility of the soil, but to lighten the labor and increase the net profits of farming.

GENESEE COUNTY.

The fifteenth annual show of the Genesee County Agricultural Society was held on the grounds of the Society, at Flint, from the 28th of September to the 1st of October—the inclemency of the weather inducing the officers to continue it a day longer than had been previously arranged. Although some friends of the Society had doubted the expediency of holding a show the present year on account of the unfavorable character of the season, the result is pronounced most gratifying—the exhibition being, though not all that might have been wished, highly respectable, while the numbers in attendance, and the financial receipts exceeded those of any previous year. The report of the treasurer shows the receipts from the show to have been $973 25, and that there is a balance on hand of $320 28. The annual address was delivered by Sanford Howard, Secretary of the State Board of Agriculture.

This Society makes an annual report through its Secretary, showing the general condition of agriculture, horticulture and manufactures in the county, from year to year. The report for 1864, shows that the season was very unfavorable to nearly all productions of the soil. A winter remarkable for sudden changes from mildness to great severity, without the usual covering of snow, was followed by a cold, wet spring, greatly delaying all farm operations; the spring succeeded by a summer of almost unprecedented drought, by which most crops were greatly injured. The general results of the season are summed up as follows:

Wheat not over half an average crop in yield; the quality very fine. Indian corn not over half an average crop; quality good. Oats, three-fourths of an average crop. Barley, light in yield, but of good quality. Clover-seed generally yielded well. Hay, about two-thirds of an average crop; quality good. Buckwheat poor. Beans, good in the southern part of the county, but light or a total failure in other portions. Potatoes, though believed at one time to be nearly ruined for want of moisture, were so much benefitted by the early autumn rains that they gave a fair yield of good quality. Of root crops, the Swedish turnip or ruta-baga, and other turnips, did well where properly cultivated. Apples were not as abundant as usual; they were injured by worms more than heretofore. Orchards are increasing in the county.

The number of cattle in the county has diminished since 1863, the cause being partly the unusual demand from the East, with high prices, partly the scarcity of fodder, and partly the transfer of the farmers' interest from cattle to sheep. The inducements to breed and rear good horses continue. Some good specimens, especially of the roadster class, partaking largely of the Black-Hawk Morgan blood, were exhibited at the show. Sheep are on the increase in the county. A considerable number of Merinos have lately been introduced from Vermont and New York. In 1864, there was sold in the county, 485,000 lbs. of wool, at an average price of 95 cts. per lb. It is said that the farmers bring their wool to market much better cleaned and tied than formerly, and that they find their compensation in a higher price. "Genesee county," says the Report, "is beginning to acquire a reputation for her wool; it depends upon the growers whether that reputation shall be good or bad. Let them make it a practice habitually to prepare their clips for market in the best and cleanest manner—and a character for this valuable product will soon be established that will produce competition to obtain Gensee county wool, and enable it to command the highest market rates. Already purchasers say they find a marked improvement in the cleanliness, style of tying up, and strings used. Let this be persevered in and our farmers will find it to pay. As might be expected, the interest felt in fine-wooled sheep manifested itself at our show in an extensive and choice exhibition."

Labor-saving machinery—such as reaping and mowing machines—is fast alleviating manual toil in the field. The manufacturing interests of the county are flourishing. The manufacture of agricultural implements is extensively carried on and is rapidly increasing. A large portion of the plows used in the county are of home make.

The society is congratulated on its increasing prosperity, the erection of more new buildings, and the prospect of further improvement of its grounds.

Officers.—The officers of the Society for 1864, are Levi Walker, of Flint, President; F. H. Rankin, Secretary; J. W. Begole, Treasurer; with twenty-one Vice Presidents, an Executive committee, consisting of seven members, and a Board of Auditors.

JACKSON COUNTY.

The Secretary of the Jackson County Agricultural Society gives the following account of the receipts and expenditures for the year 1864:

Receipts.

Balance on hand January, 1864,	$546 06
Received for rents and articles sold,	116 94
Received for tickets for the show,	1,245 31
Balance due Treasurer,	9 11
	$1,917 42

Expenditures.

Paid mortgage,	$1,018 75
Expense account and interest,	546 12
Premiums,	352 55
	$1,917 42

Officers.—M. Dorrill, President; W. Boughton, Secretary; F. W. Anthony, Treasurer.

HILLSDALE COUNTY.

The Farmers', Mechanics' and Stock-Breeders' Association of Jonesville, held two exhibitions in 1864, viz: on the 4th of July and on the 12th, 13th and 14th of October—the former "being for a particular celebration of the day," and latter the annual show.

Receipts.

The receipts at the meeting on the 4th of July, are reported at	$772 50
Receipts at the October meeting,	1,128 00
	$1,900 50

Expenditures.

There were paid out for premiums, trials of speed of trotting horses, &c., at the July meeting,........	$355 00
For payment of expenses of the July meeting, and improvement of the grounds of the Association,.	417 50
Paid in premiums at the October meeting, and expenses attending the same, and in improvements of the buildings and grounds of the Association,	1,128 00
	$1,900 50

Officers.—E. O. Grosvenor, President; Witter J. Baxter, Secretary; Geo. C. Munro, Treasurer.

KALAMAZOO COUNTY.

The time appointed for holding the Annual Show of the Kalamazoo County Agricultural Society, viz: the 6th, 7th and 8th of October, proved very unfavorable, on account of stormy weather. Still, the exhibition of stock, fruits, vegetables and other products, as well as implements, &c., was never better. The inclemency of the weather, only, by preventing the attendance of people, caused a deficiency in the financial returns. The Annual Address was delivered by Sanford Howard, Secretary of the State Board of Agriculture. The receipts and expenditures of the Society for the year are stated as follows:

Receipts.

Sale of entry-tickets,................................	$133 30
Sale of season tickets and other collections,.........	190 00
Rent of stand,..	29 00
Insertion of advertisements in premium list,.........	125 00
	$477 30

Expenditures.

For printing, stationery, &c.,........................	$99 54
Speaker's expenses, help in office, gate-tenders, &c.,..	87 25
Hay,..	16 00

F. Little, services as Secretary,	100 00
Balance on hand,	174 51
	$477 30

Officers.—W. H. Cobb, of Kalamazoo, President; Eli R. Miller, Vice President; Henry E. Hoyt, Secretary; H. F. Cook, Treasurer, with an Executive Committee consisting of five members.

KENT COUNTY.

The sixteenth annual show of the Kent County Agricultural Society was held at Grand Rapids, on the 29th and 30th of September, and the 1st of October, 1864. The display of animals and articles appears to have answered expectations. The comittee on fruits speak of the collection of apples, pears and grapes as being "as fine as they ever saw on exhibition." The receipts and expenditures of the Society for the year are stated as follows:

Receipts.

From former treasurer,	$ 43 60
From the county,	163 12
Sale of tickets for the show,	520 20
Advertising in premium list,	81 00
From W. S. H. Welton,	10 15
	$818 07

Expenditures.

Paid on land,	$ 357 22
Premiums paid to Dec. 16th,	210 75
Forage,	26 96
Printing premium list, posters, &c,	99 00
Police and incidentals,	41 30
Balance on hand,	82 84
	$818 07

The Society owes on 34 acres of land purchased at $100 per acre, $1,388 75, which debt is being yearly lessened, and the grounds improved.

Officers.—E. H. Knapp, President; S. R. Atwater, Secretary; G. S. Deane, Treasurer, with an Executive Committee consisting of five members.

MACOMB COUNTY.

The fifteenth annual exhibition of the Macomb County Agricultural Society, was held on the grounds of the Romeo Stock Association, in the village of Romeo, from the 6th to the 8th of October, 1864. The weather was very unfavorable on account of rain, but the show on the whole, is pronounced "a decided succes." The number of sheep exhibited is said to have been larger than at any former show of the Society, and the display of cattle and horses, implements, &c., was good. The annual address was delivered by R. F. Johnstone, Secretary of the State Agricultural Society.

It appears that this Society had, by the passage of a resolution extended to the citizens of the counties of Oakland, St. Clair and Lapeer, an invitation to compete at its shows, on condition that the Societies of those counties should grant a similar privilege to the citizens of Macomb county. The invitation was responded to by the Agricultural Society of Oakland County, and there was an interchangeable competition to some extent.

The receipts and expenditures of the Society for the year are given as follows:

Receipts.

Balance received from former treasurer, ...	$52 30
Bonds of the township of Armada (money lent) ..	400 00
Interest on the above bonds one year, ...	28 00
Sale of tickets at "Shearing Festival,"	86 60

Entry-fees for "Shearing Festival,"	75 00
Sale of tickets at Annual Show,	1,024 27
	$1,666 17

Expenditures.

Orders drawn by President and Secretary,	$1,209 83
Balance in Treasurer's hands,	$456 34

Officers.—Charles C. Leech, Utica, President; Charles Andrews, Vice President; C. W. Whitney, Secretary; A. W. Sterling, Treasurer, with a Board of Directors consisting of eight members, a Business Committee consisting of three members, and an Auditing Committee consisting of three members.

This enterprising and flourishing Society held a "Sheep-shearing Festival" on the 8th of June, 1864, at which very liberal premiums were paid for rams and ewes sheared on the occasion. The return of the Secretary does not give the particulars in regard to the rules by which the judges and competitors were governed; it gives the names of the successful competitors and the weights of the fleeces. The weights of the carcasses of the sheep were not returned. It is inferred that the sheep were required to be washed, as it is stated that some were ruled out on the ground of not being washed. But there seems to have been much difference in the condition of the fleeces of the different sheep, according as the washing was well or ill done. The breed of the sheep is not mentioned, though it seems probable it was the Merino, or families of that breed. The results of the trial, however, appear to be of so much interest that it seems proper to preserve them. They are, therefore, presented in a condensed form, as follows, the persons named having been awarded premiums in the order in which they are placed:

Rams—Three Years Old and Over.

	Weight of Fleece.
1. Ira H. Butterfield, Utica,	14 lbs. 02 oz.
2. Loren Andrews, Washington,	14 lbs.

Two Years Old.

1. Ira H. Butterfield,	14 lbs. 02 oz.
2. James M. Thorington, Washington,	10 lbs. 11 oz.
3. George Chandler, Romeo,	11 lbs. 04 oz.

One Year Old.

1. Ira H. Butterfield,	11 lbs. 09 oz.
2. Loren Andrews,	9 lbs. 15 oz.
3. Harvey Mellen, Romeo,	9 lbs 05 oz.

The award in the class of two-years-olds, of the second premium to Mr. Thorington, and the third to Mr. Chandler, though Mr. C 's ram had the heaviest fleece, is probably explained by the statement that the wool of Mr. C.'s ram was not so long and more gummy than that of Mr. T.'s. It is mentioned that Alexander Wattles, of Troy, showed a ram whose fleece, said to have been "extraordinary fine," weighed, unwashed, 16 lbs. 13 oz., but he could not compete in the regular classes, because not washed.

Ewes—Best Five, Three Years Old, or Over.

	Weight of Fleece.
1. Harvey Mellen,	33 lbs. 04 oz.
2. Ira H. Butterfield,	38 lbs. 04 oz.
3. Loren Andrews,	31 lbs. 04 oz.

Two Years Old.

1. Ira H. Butterfield,	40 lbs. 15 oz.
2. Harvey Mellen,	29 lbs. 03 oz.
3. Loren Andrews,	34 lbs. 10 oz.

One Year Old.

1. Harvey Mellen,	32 lbs. 10 oz.
2. Ira H. Butterfield,	32 lbs. 12 oz.
3. Loren Andrews,	33 lbs. 03 oz.

Whether any of these ewes reared lambs, is not stated in the return. It is mentioned that some were offered that had lambs, "but did not raise them, and could not compete." The fleeces of the ewes which took the second premium in the class of three years old and over, are said to have been "in very bad condition," though the quality was otherwise good. No explanation is given in regard to the weights of the fleeces (29 lbs. 03 oz.) of the lot which took the second premium in the class of two-year-olds, the fleeces of the other lots in the same class weighing considerably more. It is remarked that there seemed to be entire unanimity of opinion between the judges and competitors, that the object should be to breed "sheep that will give quality of wool, rather than weight of fleece." As this was the first public shearing that the Society has held, it is probable that the regulations were less perfect than will be adopted on future occasions of the kind.

In connection with the shearing of sheep, as above noticed, premiums were awarded to the shearers. The rules governing the awards are not mentioned in the return.

OTTAWA COUNTY.

The ninth annual show of the Ottawa County Agricultural Society was held on the 30th of September, 1864. The place where the show was held, though not distinctly mentioned in the return, is understood to have been Lamont. The exhibition is represented as surpassing, largely, those of previous years, and the Society is declared to be in a prosperous condition. The annual address was delivered by Hon. Henry Pennoyer, and is characterized as "short, pithy, and well suited to the occasion." It was resolved to purchase new show grounds, consisting of fifteen acres of land, near Lamont, at a cost of $300. The receipts and expenditures are stated as follows:

Receipts.

Balance on hand, from 1863,	$149 58
Membership-tickets,	146 00
Gate-tickets,	56 00
	$ 351 58

Expenditures.

Printing,	$ 56 00
Premiums and incidental expenses,	195 58
Balance on hand,	100 00
	$ 351 58

Officers.—Silvius Waters, President; Sylvester Luther, Secretary; Miner Hedges, Treasurer.

NOTE.—At the date of printing this page, no returns had been received from the Michigan State Agricultural Society; though the Secretary of that Society had informed the Secretary of the State Board of Agriculture about the first of January, that returns would soon be forwarded.

REGISTER OF
METEOROLOGICAL OBSERVATIONS,
FOR THE YEAR 1864,
TAKEN AT THE
State Agricultural College of Michigan,
BY R. C. KEDZIE
PROFESSOR OF CHEMISTRY.

LATITUDE, 42° 42′ 24″; LONGITUDE, 7° 33′ 19″ WEST OF WASHINGTON.
Height above the Sea, 895 Feet.

OF JANUARY, 1864.

Day of Month.	THERM THE		Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PER CENTAGE OF SATURATION.		
	7 A. M.	2 P. M.		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	0	-1	-23	28.555	28.813	28.899	28.858	.044	.027	.018	100	100	100
2	-12	-	-16	29.030	29.130	29.159	29.106	.018	.023	.065	51	68	17
3	-6	1	-6	29.080	29.200	29.020	29.040	.022	.054	.031	63	78	52
4	9	2	-2	29.110	29.057	29.101	29.089	.036	.099	.042	56	64	59
	5	1	0	28.891	29.944	29.061	28.965	.036	.028	.038	56	25	73
6	3	1	1	29.154	29.275	29.346	29.258	.027	.042	.039	49	59	57
	8	1	2	29.152	29.241	29.114	29.136	.034	.063	.025	54	81	37
8	8	1	-6	29.020	28.945	28.921	28.962	.034	.057	.024	54	79	47
9	-4	1	-4	28.921	28.889	28.922	28.906	.014	.039	.034	34	57	54
10	10	1	7	28.883	28.887	28.870	28.880	.039	.078	.039	57	83	57
11	14	1	11	28.785	28.760	28.713	28.753	.051	.055	.032	63	53	34
12	20	3	10	28.525	28.448	28.495	28.489	.059	.082	.105	55	47	75
13	26	3	13	28.500	28 544	28.624	28.556	.105	.162	.091	75	89	85
14	28	4	16	28.606	28.581	28.642	28.609	.117	.147	.130	76	57	78
15	20		9	28.746	28.884	28.921	28.850	.091	.068	.094	85	58	73
16	10		9	28.951	28.887	28.832	28.890	.068	.130	.111	100	78	67
17	38		26	28.770	28.825	28.979	28.858	.103	.144	.131	45	63	70
18	29		11	29.012	28.935	28.901	28.919	.105	.117	.094	66	76	73
19	14		14	28.775	28.665	28.756	28.732	.059	.068	.084	65	58	71
20	22		5	28.841	29.018	29.115	28.991	.084	.123	.105	71	77	75
21	7		5	29.242	29.196	29.015	29.151	.039	.129	.123	57	88	77
22	28		17	29.062	29.057	28.968	29.029	.117	.118	.094	76	68	73
23	29		32	28.838	28.650	28.664	28.717	.105	.189	.199	66	56	74
24	34		27	28.608	28.565	28.535	28.569	.183	.173	.212	90	60	82
25	31		26	28.549	28.663	28.413	28.542	.155	.203	.196	89	82	68
26	35		32	28.715	28.779	28.673	28.722	.142	.173	.160	70	60	64
27	39		29	28.650	28.738	28.767	28.718	.173	.296	.254	73	79	92
28	42		32	28.814	28.863	29.009	28.895	.212	.349	.199	82	81	57
29	36		28	29.051	29.056	28.961	29.023	.129	.129	.168	61	61	89
30	30		29	28.845	28.822	28.932	28.866	.167	.168	.204	100	89	100
31	35		32	29.076	29.007	28.639	28.907	.183	.186	.199	90	81	00
Sums.	...		......	......	......	......	......	......	......	......	......	......	......
Means	...		10°.84	......	......	......	28.875	.088	.120	.106	65	69	65
Average,			......	......				105			66		

OF FEBRUARY, 1864.

Day of Month.	Thermom the op 7 A. M.	2 P. M.	9 P. M.	Min. Thermometer.	Barometer Height Reduced to Freezing Point. 7 A. M.	2 P. M.	9 P. M.	Mean.	Force or Pressure of Vapor, in Inches. 7 A. M.	2 P. M.	9 P. M.	Relative Humidity, or Per centage of Saturation. 7 A. M.	2 P. M.	9 P. M.
1	39	38	34	25	28.332	28.790	28.820	28.641	.212	.203	.170	82	82	80
2	32	37	28	21	28.706	28.667	28.707	28.693	.162	.195	.118	80	82	68
3	23	27	24	20	28.801	28.733	28.550	28.695	.099	.123	.117	64	77	87
4	36	37	32	28	28.158	28.214	28.299	28.224	.173	.208	.155	73	91	79
5	32	35	32	27	28.454	28.394	28.504	28.451	.155	.178	.168	79	81	89
6	31	34	28	28	28.707	28.712	28.772	28.730	.127	.170	.143	62	80	79
7	27	39	33	22	28.617	28.303	28.334	28.418	.136	.203	.152	78	82	63
8	20	26	17	15	28.458	28.555	28.689	28.567	.111	.148	.071	86	89	51
9	14	22	14	8	28.827	28.869	28.955	28.884	.091	.135	.082	85	88	84
10	4	17	9	4	29.141	29.201	29.132	29.158	.039	.096	.159	57	85	63
11	20	42	39	18	28.951	28.722	29.124	28.932	.094	.241	.225	73	84	91
12	20	36	26	25	28.812	28.826	28.816	28.818	.088	.212	.180	62	82	78
13	23	42	39	29	28.666	28.525	28.444	28.545	.130	.175	.186	78	50	67
14	32	34	25	17	28.767	28.914	28.941	28.874	.129	.160	.105	61	64	66
15	28	44	31	3	28.705	28.518	28.496	28.573	.125	.206	.138	69	49	71
16	5	3	–4	–18	28.598	28.728	28.855	28.727	.045	.024	.005	76	54	13
17	–11	2	–4	–17	28.986	29.268	29.253	29.161	.002	.004	.027	12	10	49
18	–10	7	–4	–10	29.248	29.291	29.383	29.306	.006	.057	.004	20	9	100
19	3	15	18	5	29.309	29.176	28.971	29.152	.027	.074	.078	49	83	59
20	22	38	37	19	28.891	28.768	28.643	28.767	.088	.151	.142	62	62	51
21	37	45	40	30	28.663	28.676	28.702	28.680	.195	.260	.209	82	78	75
22	35	41	32	29	28.494	28.558	28.661	28.571	.178	.244	.155	81	91	79
23	45	50	30	28	28.508	28.499	28.653	28.552	.247	.255	.131	71	57	70
24	33	47	39	30	28.753	28.807	28.847	28.802	.175	.270	.173	89	72	60
25	38	43	32	30	28.545	28.555	28.906	28.669	.203	.228	.142	82	76	70
26	25	33	29	22	29.104	29.137	29.001	29.081	.123	.136	.181	87	62	70
27	34	41	43	25	28.914	28.751	28.566	28.744	.170	.218	.265	80	76	92
28	29	33	25	14	28.851	28.852	28.919	28.874	155	.149	.099	89	71	64
29	18	25	28	13	29.048	29.119	29.080	29.082	.075	.111	.118	70	75	68
30	...	..	..	.....	......	......	......	......	......	......	......	......	......	......
31	...	..	..	.....	......	......	......	......	......	......	......	......	......	......
Sums.	...	..	..	.....	......	......	......	......	......	......	......	......	......	......
Means	...	..	..	3° 89	......	......	......	28.771	.122	.167	.162	70	69	70
Average, ...				.....	....				.150			70		

TH OF MARCH, 1864.

Day of Month.	THERMOM THE OP				Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PER CENTAGE OF SATURATION.		
	7 A. M.	2 P. M.	9 P. M.			7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	22	35	20		11	28.993	28.871	28.950	28.905	.084	.142	.076	71	70	52
2	24	33	24		18	28.955	29.961	29.108	28.891	.077	.113	.061	60	60	47
3	26	52	42		15	29.112	28.941	28.810	28.804	.071	.208	.222	51	53	83
4	35	53	32		21	28.658	28.493	28 448	28.366	.129	.295	.181	61	73	100
5	22	35	28		11	28.694	28.448	28.670	28.487	.111	.108	.099	86	53	64
6	23	45	39		19	28.711	28.694	28.714	28.556	.106	.138	.178	86	46	73
7	30	45	33		21	28.711	28.617	28.649	28.529	.111	.228	.150	69	76	80
8	27	49	31		21	28.711	28.718	28.817	28.642	.129	.199	.118	88	57	68
9	27	43	42		22	29.004	28.936	28.758	28.799	.093	.100	.105	63	36	58
10	34	43	49		32	28.556	28.461	28.350	28.309	.175	.278	.322	89	100	92
11	51	44	32		30	28.145	28.141	28.412	28.749	.348	.241	.150	93	84	80
12	32	40	32		27	28.578	28.674	28.770	28.524	.143	.173	.143	79	73	79
13	29	32	28		17	28.795	28.851	28.937	28 694	.123	.143	.117	77	79	76
14	24	32	23		9	28.979	28.926	23.915	28.813	.111	.143	.089	86	79	72
15	13	23	24		10	28.955	28.908	28.917	28.777	.048	.106	.077	62	86	60
16	17	34	28		16	28 985	28.995	28.784	28.838	.063	.155	.123	67	79	77
17	27	37	33		22	28.635	28.536	28.424	28.698	.105	.170	.168	66	80	89
18	25	23	12		2	28.261	28.456	28.132	28.599	.100	.101	.075	74	86	100
19	4	23	10		6	28.826	23.844	28.343	28.871	.043	.096	.062	75	85	100
20	8	13	5		-4	28.879	28.986	29.061	28.975	.054	.063	.015	78	81	76
21	8	25	18		-8	29.094	29.129	29.234	29.152	.042	.089	.082	59	72	84
22	7	25	14		-10	29.297	29.294	29.221	29.271	.048	.094	.063	77	73	67
23	2	36	24		-2	29.226	29.192	29.165	29 198	.024	.170	.141	47	80	100
24	19	47	28		13	29.191	29.106	28.998	29.097	.087	.262	.142	84	84	88
25	35	45	38		30	28.830	28.704	28.620	28.718	.175	.244	.199	89	91	90
26	36	54	47		25	28.929	28.990	29.047	28 987	.183	.334	.335	90	86	100
27	36	50	37		23	29.086	29.057	29.048	29.067	.183	.335	.199	90	93	90
28	47	58	59		43	28.886	28.577	28.541	28.668	.262	.282	.483	84	63	100
29	48	45	35		31	28.496	28.487	28.496	28.493	.311	.265	.183	100	92	90
30	35	40	37		31	28.526	28.590	28.678	28.598	.183	.203	.199	90	82	90
31	36	44	40		31	28.737	23.743	28.786	28.755	.191	.222	.203	90	83	82
Sums.	.	..	..	..	......	......	......	......	......	......	......	......	......	......	......
Means	..	..	..	64	17°.18	......	......	......	28.764	.126	.184	.156	77	75	81
Average,....					....	....	....		....		.155			77	

TH OF APRIL, 1864.

Day of Month.	THERMOM THE OPE 7 A. M.	 2 P. M.	 9 P. M.		Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT. 7 A. M.	 2 P. M.	 9 P. M.	 Mean.	FORCE OR PRESSURE OF VAPOR, IN INCHES. 7 A. M.	 2 P. M.	 9 P. M.	RELATIVE HUMIDITY, OR PER CENTAGE OF SATURATION. 7 A. M.	 2 P. M.	 9 P. M.
1	38	46	40		34	28.647	28.585	28.585	28.606	.216	.260	.238	91	78	100
2	39	47	40		31	28.586	28.638	28.703	28.642	.229	.273	.235	100	85	91
3	46	54	45		36	28.831	28.812	28.788	28.809	.262	.308	.262	84	74	84
4	42	45	41		37	28.686	28.601	28.573	28.620	.244	.251	.278	91	84	100
5	41	47	45		38	28.634	28.713	28.821	28.723	.248	.298	.300	100	92	100
6	42	52	47		37	28.984	29.169	29.030	29.028	.267	.335	.298	100	93	92
7	42	59	49		34	29.026	29.905	28.924	29.285	.214	.396	.309	91	76	85
8	41	57	57		40	28.895	28.730	28.766	28.797	.244	.380	.469	91	76	94
9	47	58	47		40	28.625	28.564	28.547	28.505	.298	.426	.449	92	82	100
10	45	45	43		24	28.528	28.547	28.680	28.585	.278	.275	.241	100	92	84
11	38	56	49		41	28.907	28.778	28.784	28.823	.199	.367	.296	90	71	79
12	45	53	42		34	28.729	28.713	28.730	28.724	.275	.321	.241	92	80	84
13	41	47	42		33	28.789	28.821	28.784	28.798	.212	.234	.244	82	65	91
14	41	53	43		35	28.872	28.857	28.854	28.861	.225	.282	.254	91	73	92
15	39	42	39		31	28.793	28.738	28.675	28.735	.229	.265	.216	100	92	91
16	37	47	37		23	28.670	28.656	28.709	28.678	.212	.249	.208	100	77	91
17	38	52	42		17	28.835	28.834	28.844	28.838	.199	.282	.202	90	63	62
18	34	51	38		19	28.915	28.898	28.934	28.916	.155	.268	.212	79	58	82
19	35	54	42		18	29.021	28.980	28.982	28.994	.178	.336	.218	81	75	76
20	36	53	39		20	29.010	28.374	28.885	28.923	.165	.296	.199	72	59	74
21	46	61	51		38	28.938	27.895	28.889	28 907	.249	.387	.308	77	63	74
22	49	54	52		43	28.848	28.792	28.823	28.821	.270	.338	.374	72	100	100
23	47	45	41		35	28.972	28.918	28 959	28.916	.298	.275	.244	92	92	91
24	39	49	48		37	28.941	28.760	28.730	28.810	.203	.335	.322	82	100	92
25	46	49	46		40	28.699	28.720	28 735	28.718	.300	.295	.298	100	73	92
26	45	61	59		41	28.841	28.842	28.887	28.840	.265	.442	.456	92	83	88
27	45	52	40		29	28.916	28.975	29.101	28 997	.249	.309	.209	77	64	75
28	36	52	39		28	29.162	29.149	29.154	29.155	.186	.282	.203	81	63	82
29	38	59	47		35	29.180	29.096	29 074	29.117	.186	.356	.283	81	62	78
30	42	44	38		34	28.974	28.887	28.878	28.913	.218	.251	.216	76	84	91
31	..	..	..	..	......	......	......	......	......	......	......	......	......	......	......
Sums.	..	..	..	..	......	......	......	......	......	......	......	......	......	......	......
Means	..	..	..	93	32°.90	......	......	......	28.843	.235	.314	.276	88	77	87
Average, ...					......	......	......	......	......	.275			84		

NTH OF MAY, 1864.

Day of Month.	THERMO THE O			Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY OR PER CENTAGE OF SATURATION.		
	7 A. M.	2 P. M.	9 P. M.		7 A. M.	2 P. M.	9 P. M.	Mean.	9 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	43	60	4	33	28.780	28.618	28.698	28.697	.244	.376	.247	91	59	71
2	37	47	3	31	28.616	28.605	28.698	28.639	.199	.234	.225	90	65	91
3	34	53	4	30	28.732	28.759	28.870	28.787	.175	.282	.244	89	58	91
4	41	60	4	39	29.017	28.971	28.954	28.981	.222	.380	.308	83	56	79
5	58	79	6	55	28.969	28.891	28.841	28.900	.399	.789	.595	72	68	76
6	69	73	5	45	28.847	28.823	28.877	28.847	.537	.704	.388	71	66	100
7	54	69	5	50	28.809	28.757	28.753	28.773	.375	.608	.487	93	80	94
8	65	67	6	50	28.802	28.720	28.701	28.741	.543	.577	.491	79	85	88
9	60	69	6	32	28.707	28 626	28.538	28.624	.456	.572	.570	88	76	89
10	36	43	4	30	28.649	28.776	28.722	28.716	.212	.215	.231	100	69	83
11	36	54	41	35	28.859	28 853	28.796	28.836	.186	.295	.241	81	68	84
12	44	66	5	42	28.766	28.717	28.720	28.734	.251	.462	.378	84	85	81
13	50	64	51	42	28.775	28.759	28.808	28.781	.295	.476	.335	73	69	80
14	52	62	5	49	28.872	28.805	28.800	28.826	.321	.443	.391	74	65	87
15	54	70	6	52	28.800	28.799	28.839	28.813	.403	.509	.523	100	75	94
16	56	70	5	49	28.869	28.831	28.837	28.846	.433	.641	.411	100	77	60
17	56	72	6	52	28.858	28.831	23.829	28.839	.420	.664	.510	94	69	88
18	62	74	6	50	28.838	28.842	28.838	28.839	.460	.677	.478	83	60	88
19	63	76	6	50	28.899	28.880	28.876	28.885	.429	.691	.536	77	63	84
20	62	84	6	57	28.899	28.812	28.772	28.828	.469	.915	.570	94	69	89
21	69	76	6	61	28.777	28.741	28.779	28.766	.608	.731	.631	80	67	81
22	63	68	6	53	28.776	28.836	28.783	28.865	.543	.586	.491	94	80	88
23	70	82	6	51	28.695	28.628	29.644	28.656	.591	.935	.621	89	66	85
24	62	71	6	52	23.672	28.661	28.607	28 647	.487	.614	.483	94	68	78
25	56	61	6	51	28.662	28.689	28.707	28.686	.435	.505	.505	100	94	94
26	57	72	6	52	28.712	28.691	28.681	28.695	.449	.641	.543	100	77	94
27	63	75	5	42	28.741	28.781	28.909	28.810	.426	.637	.327	82	56	57
28	50	70	5	50	29.033	29.009	28.983	29.008	.249	.505	.354	77	56	66
29	56	68	6	44	28.870	28.787	28.721	28.776	.363	.559	.497	81	72	83
30	66	69	7	54	28.814	28.676	28.650	28.780	.436	.641	.746	94	77	64
31	77	80	5	50	28.760	28.761	28.847	28.789	.680	.863	.456	81	72	88
Sums.	..	..	.	......	......	......	......	......	......	......	......	......	......	......
Means	..	..	.	46°.22	......	......	......	28.787	.396	.572	.445	80	69	83
Average,	.	.	.	......	......	......	......	......	.470			77.		

NTH OF JUNE, 1864.

Day of Month.	Ther the				Min. Thermometer.	Barometer Height Reduced to Freezing Point.				Force or Pressure of Vapor, in Inches.			Relative Humidity, or Per centage of Saturation.		
	7 A. M.	2 P. M.				7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	53	65			40	28.965	28.957	28.948	28.957	.375	.483	.325	93	78	93
2	85	72			36	28.978	28.900	28.938	28.939	.362	.599	.365	87	59	76
3	59	69			43	28 984	28.914	28.908	28.935	.348	.554	.420	86	64	94
4	62	73			50	28.906	28.705	28.744	28.785	.456	.638	.405	88	62	94
5	71	72			52	28.681	28.613	28.664	28.653	.658	.680	.720	90	81	95
6	57	65			35	28.830	28.961	29.046	28.946	.380	.449	.335	76	61	93
7	58	68			47	29.182	29.136	29.088	29.135	.348	.524	.378	86	66	81
8	59	70			56	28.998	28.870	28.693	28.854	.439	.568	.631	88	67	81
9	72	79			39	28.518	28.614	28.651	28 594	.693	.805	.407	85	65	63
10	50	62			37	28.881	28.884	28.889	28.884	.288	.407	.350	78	63	75
11	53	63			41	29.003	28.998	28.990	28.997	.309	.411	.394	85	60	82
12	52	65			31	29.140	29.120	29.183	29.181	.295	.416	.308	68	57	74
13	48	71			35	29.208	29.150	29.116	29.158	.285	.591	.334	85	68	86
14	52	72			35	29.126	29.013	28 980	29.039	.348	.651	.390	86	66	93
15	55	75			45	28.994	28.955	28.933	28.961	.405	.704	.500	94	60	88
16	62	79			50	29.008	28.940	28.936	28.961	.497	.805	.543	83	65	94
17	68	87			56	28 979	28.946	28.928	28.951	.570	1.080	.529	89	68	89
18	67	76			66	28.926	28.995	28.891	28.937	.621	.773	.682	85	71	90
19	69	91			58	28.932	28.897	28.917	28.915	.671	1.146	.745	95	74	86
20	70	93			58	28.990	28.998	29.004	28.997	.698	1.243	.785	85	69	90
21	73	94			66	29 062	29.055	29.059	29 059	.706	1.173	.798	90	71	95
22	82	78			61	29.082	29.048	29.017	29.049	.886	.856	.685	87	87	100
23	74	87			62	29.075	29.023	28.991	29.029	.720	1.132	.826	95	63	95
24	79	95			69	29.021	28 979	28.964	28.988	.870	1.817	.745	91	67	95
25	83	93			69	28.966	28.899	28.888	28.918	1.003	1.245	.997	83	61	73
26	81	92			55	28.874	28.784	28.864	28.841	.904	1.231	.785	83	59	82
27	58	63			38	29.059	29.006	29.131	29.065	.426	.545	.862	82	67	87
28	56	77			53	29.182	29.127	29.017	29.109	.363	.717	.516	81	64	84
29	58	76			57	28 944	28.891	28.835	28.907	.483	.793	.798	100	95	95
30	69	79			63	28.813	28.809	28.797	28.806	.708	.931	.785	100	91	100
31	..	..	..	..	......	......	......	......	.....	.....	......	......	......	......	......
Sums.	..	..	..	..	......	......	......	......	......	......	......	......	......	......	......
Means	..	..	..	03	50°.10	......	......	......	28.949	.530	.772	.595	87	58	87
Average, ...					....	....				632			81.		

TH OF JULY, 1864.

Day of Month.	Therm o 7 A M.	2 P. M.		Min. Thermometer.	Barometer Height Reduced to Freezing Point. 7 A. M.	2 P. M.	9 P. M.	Mean.	Force or Pressure of Vapor, in Inches. 7 A. M.	2 P. M.	9 P. M.	Relative Humidity, or Per centage of Saturation. 7 A. M.	2 P. M.	9 P. M.
1	72	85		61	28.818	28.726	28.656	28.783	.695	.950	.812	95	87	100
2	64	82		67	28.795	28.811	28.834	28.813	.596	.804	.612	100	83	90
3	64	76		50	28.886	28.785	28.888	28.886	.549	.677	.510	89	60	88
4	66	78		69	28.894	28.947	28.946	28.929	.530	.692	.576	97	52	92
5	71	85		76	28.938	28.989	28.877	28.935	.639	.923	.688	100	79	92
6	67	81		65	28.732	28.797	28.779	28.769	.648	.931	.812	95	91	91
7	70	84		61	28.719	28.703	28.797	28.739	.733	1.038	.758	100	84	74
8	69	80		55	28.985	29.029	29.047	29.020	.658	.855	.662	90	62	100
9	68	86		66	29.076	28.987	28.822	28.962	.648	1.010	.771	95	74	95
10	75	84		63	29.851	28.821	28.774	28.815	.798	.970	.704	95	67	86
11	76	81		52	28.767	28.778	28.831	28.799	.812	.855	.704	91	62	73
12	62	80		48	28.993	29.009	29.023	29.008	.529	.912	.621	89	69	85
13	65	80		48	29.123	29.110	29.083	29.105	.543	.836	.591	94	65	89
14	61	79		53	29.082	29.045	28.983	29.037	.500	.832	.626	100	72	95
15	71	84		58	28.986	28.969	28.895	28.950	.695	1.070	.695	95	74	95
16	75	92		69	28.857	28.849	28.819	28.842	.812	1.245	.870	91	61	91
17	76	80		65	28.858	29.022	29.002	28.961	.841	.882	.758	91	69	74
18	73	92		59	29.060	29.089	29.046	29.065	.772	1.217	.772	86	67	86
19	77	92		67	29.035	28.982	28.749	28.955	.873	1.295	.827	83	55	86
20	76	83		49	28.937	28.955	29.000	28.964	.799	1.046	.601	86	77	65
21	60	75		38	29.150	29.135	29.106	29.134	.446	.746	.491	77	64	88
22	56	79		43	29.199	29.114	29.088	29.130	.394	.895	.516	82	72	70
23	65	84		44	29.144	29.097	29.061	29.100	.564	.978	.551	79	61	75
24	62	84		52	29.078	29.034	28.967	29.026	.523	.992	.680	94	64	81
25	65	82		55	28.921	28.844	28.812	28.859	.577	.956	.652	85	64	73
26	72	87		54	28.910	28.838	28.969	28.906	.717	1.091	.745	77	55	70
27	67	91		53	29.003	29.075	28.929	29.002	.644	1.147	.782	86	51	90
28	70	93		60	29.043	28.864	28.864	28.924	.641	1.190	.772	77	52	86
29	76	96		58	28.841	28.763	28.788	28.797	.843	1.440	.813	83	58	82
30	73	96		61	28.796	28.773	28.771	28.767	.772	1.319	.785	86	50	82
31	76	89		67	28.787	28.758	28.744	28.763	.827	1.214	.745	86	72	95
Sums.	..	..		......	......	......	......	......	......	......	......	......	......	......
Means	..	..	8	57°.61	......	......	......	28.925	.665	1.007	.692	87	67	86
Average, ..				......	......	......	......	......		.788			80	

H OF AUGUST, 1864.

Day of Month.	THERMO THE O			Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PER CENTAGE OF SATURATION.		
	7 A. M.	2 P. M.	9 P. M.		7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	73	84	71	65	28.717	28.706	28.714	28.712	.732	.789	.682	90	68	90
2	65	78	67	44	28.822	28.829	28.845	28.832	.516	.731	.459	84	81	73
3	58	85	63	46	28.894	28.806	28.782	28.827	.483	.641	.446	100	77	77
4	60	85	66	45	28.786	28.659	28.655	28.700	.456	.570	.259	88	47	40
5	65	88	67	35	28.866	28.879	28.837	28.861	.529	.569	.556	89	42	84
6	66	92	67	52	28.989	28.983	29.120	29.031	.570	.596	.556	89	43	84
7	70	89	69	54	29.120	29.095	29.070	29.095	.621	.665	.599	85	47	85
8	64	95	66	55	29.091	29.055	28.847	28.991	.529	.641	.570	89	46	89
9	67	94	75	60	29.048	28.843	28.797	28.896	.591	.697	.745	89	44	86
10	71	93	80	60	28.815	28.760	28.755	28.776	.644	.732	.800	86	41	78
11	73	99	78	67	28.739	28.790	28.798	28.776	.693	.924	.664	85	51	69
12	77	96	78	62	28.820	28.763	28.735	28.773	.799	.833	.785	86	52	82
13	73	88	69	52	28.726	28.748	28.751	28.741	.812	.778	.708	100	59	100
14	65	94	69	54	28.860	28.859	28.827	28.849	.583	.651	.599	94	45	85
15	67	93	74	62	28.852	28.808	28.769	28.809	.570	.529	.798	89	36	95
16	68	83	75	53	28.784	28.789	28.789	28.787	.648	.781	.745	95	67	86
17	61	74	56	36	29.018	29.036	29.037	29.029	.297	.497	.363	55	59	81
18	58	73	56	43	29.082	29.068	29.068	29.073	.361	.362	.378	93	36	81
19	53	79	62	50	29.100	29.031	29.002	29.044	.321	.261	.373	80	31	62
20	63	72	62	57	28.982	28.891	28.883	28.918	.386	.449	.491	67	61	88
21	62	66	64	49	28.824	28.821	28.848	28.831	.523	.522	.549	94	79	89
22	56	79	59	47	28.935	28.880	28.986	28.934	.378	.422	.473	81	46	88
23	58	75	68	60	28.910	23.868	28.808	28.862	.378	.532	.564	81	63	79
24	70	92	70	62	28.796	28.723	28.719	28.746	.577	.583	.682	85	45	90
25	74	80	59	53	28.642	28.659	28.752	28.684	.745	.342	.396	86	36	76
26	62	82	56	51	28.704	28.419	28.846	28.656	.478	.452	.337	83	44	70
27	63	71	63	52	28.548	28.635	28.721	28.635	.399	.416	.446	72	57	77
28	59	71	64	46	28.709	28.698	28.776	28.727	.396	.436	.416	76	57	72
29	63	66	54	32	28.829	28.856	28.922	28.836	.365	.376	.335	76	59	80
30	46	73	56	36	29.021	23.959	28.899	28.959	.262	.340	.365	84	45	76
31	51	72	50	36	29.108	29.073	29.064	29.081	.236	.327	.308	74	42	79
Sums.	.	..	..	......	......	......	......	......	......	......	......	......	......	......
Means	..	..	..	51°.49	......	......	......	28.851	.512	.601	.560	84	84	80
Average,.....				......	....				.558			72		

OF SEPTEMBER, 1864.

Day of Month.	THERMOMETE OPEN A				Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PER CENTAGE OF SATURATION.		
	7 A. M.	2 P. M.	9 P. M.			7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	53	78	61		47	29.064	28.971	28.973	29.003	.308	.677	.476	79	54	69
2	59	72	65		56	28.879	28.818	28.783	28.827	.470	.664	.524	73	62	66
3	61	74	63		56	28.767	28.625	28.731	28.708	.536	.677	.543	84	60	79
4	61	70	60		54	28.744	28.746	28.792	28.761	.510	.639	.464	88	69	77
5	61	65	59		58	28.789	28.879	28.965	28.878	.510	.537	.460	88	71	83
6	60	72	57		57	29.038	29.032	29.040	29.037	.416	.650	.442	72	50	83
7	57	73	62		57	29.093	29.019	28.995	29.036	.439	.599	.520	88	59	89
8	61	74	60		54	29.068	29.019	28.977	29.021	.518	.704	.523	100	78	94
9	66	79	66		55	28.957	28.872	28.800	28.876	.606	.868	.639	80	72	100
10	68	78	66		54	28.832	28.722	28.758	28.771	.580	.832	.612	97	72	90
11	61	71	52		35	28.878	28.863	28.974	28.905	.491	.612	.382	88	62	96
12	45	64	47		25	29.041	29.023	28.910	28.991	.262	.449	.309	84	61	85
13	46	58	50		36	28.986	28.891	28.809	28.962	.275	.407	.348	92	87	93
14	58	66	59		40	28.584	28.642	28.664	28.630	.459	.551	.460	97	75	83
15	50	67	55		35	28.755	28.807	28.899	28.820	.420	.510	.394	94	63	82
16	56	69	50		32	28.899	28.905	28.910	28.905	.410	.561	.362	82	55	87
17	56	73	63		55	28.895	28.767	28.629	28.764	.394	.626	.522	82	65	79
18	60	60	51		42	28.534	28.595	28.897	28.675	.491	.446	.334	88	77	86
19	48	60	45		41	29.008	28.902	28.899	28.969	.309	.438	.297	85	68	85
20	47	69	48		37	28.926	28.953	28.965	28.945	.298	.635	.334	92	90	86
21	57	75	58		46	28.916	28.819	28.814	28.849	.452	.677	.456	94	66	88
22	64	78	70		55	28.752	28.639	28.616	28.669	.570	.789	.666	89	68	77
23	68	75	56		45	28.613	28.580	28.538	28.577	.658	.738	.423	90	74	88
24	52	58	42		30	28.647	28.769	28.959	28.792	.375	.337	.241	93	70	84
25	41	56	51		44	29.056	29.035	28.969	29.020	.218	.380	.348	76	76	86
26	54	65	66		55	28.913	28.768	28.783	28.821	.378	.537	.532	81	71	63
27	64	64	53		30	28.623	28.638	28.878	28.711	.537	.536	.375	71	84	93
28	43	62	49		40	29.081	29.093	29.089	29.088	.241	.425	.321	84	64	86
29	44	46	46		38	28.768	28.840	29.083	28.930	.289	.298	.309	100	92	85
30	46	56	46		36	29.119	29.110	29.105	29.111	.286	.337	.285	92	70	85
31	..	..	....	..	.....	......	......	......	......	......	......	......	......	......	......
Sums.	..	..	....	..	.....	......	......	......	......	......	......	......	......	......	......
Means	..	..	....		4°.83	......	......	......	28.902	.422	.578	.430	87	69	87
Average, ...					....	....				.475			81		

H OF OCTOBER, 1864.

Day of Month.	THERMOME OPEN				Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PER CENTAGE OF SATURATION.		
	7 A. M.	2 P. M.	9 P. M.			7 A. M.	2 P. M.	9 P. M.	Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	41	51	47		40	29.024	28.907	28.893	28.941	.235	.283	.285	91	78	85
2	50	63	44		42	28.991	28.877	29.053	28.940	.297	.380	.262	85	76	84
3	50	60	54		46	29.075	29.066	29.081	29.074	.335	.423	.390	93	88	93
4	54	62	58		51	29.150	29.118	29.029	29.099	.375	.491	.439	93	88	88
5	58	60	56		43	28.981	28.874	28.773	28.859	.452	.437	.420	94	94	94
6	48	53	57		45	28.609	28.459	28.532	28.533	.310	.375	.321	92	93	86
7	51	54	41		29½	28.582	28.492	28.624	28.566	.348	.375	.203	93	93	82
8	35	38	33		20	28.756	28.863	28.918	28.846	.183	.136	.150	90	62	80
9	28	48	41		38	29.432	28.696	28.663	28.930	.142	.202	.184	88	62	50
10	44	59	46		25	28.566	28.709	28.916	28.727	.241	.242	.215	84	52	69
11	28	54	46		28	29.072	29.050	28.955	29.025	.130	.257	.285	78	66	85
12	45	57	41		25	28.810	28.802	28.948	28.853	.285	.206	.169	85	49	65
13	26	53	35		22	28.992	28.882	28.835	28.901	.160	.219	.208	100	54	91
14	34	62	47		29	28.775	28.747	28.684	28.735	.108	.283	.260	53	54	78
15	40	55	48		38	28.611	28.549	28.604	28.588	.235	.390	.285	91	93	85
16	41	52	39		22	28.750	28.747	28.859	28.785	.203	.196	.182	82	52	78
17	24	51	44		24	28.947	28.908	28.865	28.904	.117	.186	.196	76	51	68
18	35	47	42		32	28.838	28.812	28.795	28.815	.183	.215	.209	90	69	75
19	41	53	43		27	28.698	28.727	28.812	28.746	.222	.283	.265	83	78	92
20	27	46	32		24	28.911	28.940	28.977	28.943	.143	.204	.183	79	68	90
21	25	48	40		26	28.962	28.913	28.916	28.930	.135	.262	.212	88	84	82
22	37	58	46		35	28.874	28.845	28.792	28.837	.208	.258	.238	91	71	77
23	42	58	47		40	28.663	28.524	28.582	28.589	.231	.295	.285	83	68	85
24	42	52	34		24	28.720	28.829	28.899	28.816	.244	.223	.191	91	64	90
25	25	56	38		25	28.992	28.870	28.963	28.946	.153	.256	.212	100	61	82
26	41	59	52		38	28.886	28.822	28.682	28.797	.235	.282	.282	91	63	78
27	52	53	47		40	28.497	28.442	28.477	28.472	.348	.335	.285	93	80	85
28	43	45	45		41	28.482	28.492	28.602	28.525	.254	.251	.262	92	84	84
29	44	49	48		41	28.703	28.760	28.815	28.759	.265	.297	.310	92	85	92
30	45	52	45		38	28.934	28.938	29.020	28.964	.286	.270	.251	92	72	84
31	42	49	38		22	29.092	29.098	29.183	29.124	.235	.225	.173	91	70	73
Means	..	..	...	...	......	......	......	......	......	......	......	......	......	......	......
Sums.	..	..	...	.25	32°.95	......	......	......	28.824	.235	.284	.250	88	72	81
Average, ...					....	....	....	....	....	.256			80		

OF NOVEMBER, 1864.

Day of Month.	THERMOM THE OP				Min. Thermometer.	BAROMETER HEIGHT REDUCED TO FREEZING POINT.				FORCE OR PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY OR PER CENTAGE OF SATURATION.		
	7 A. M.	2 P. M.	9 P. M.			7 A. M.	2 P. M.	9 P. M.	Mean.	9 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.
1	25	45	38		25	29.814	29.298	29.279	29.279	.129	.173	.173	88	60	73
2	34	45	39		22	29.202	29.114	29.076	29.131	.162	.173	.152	80	60	63
3	22	46	3		23	28.938	28.719	28.536	28.731	.141	.182	.136	100	61	62
4	34	40	3		23	28.263	28.282	28.499	28.345	.155	.186	.106	79	81	58
5	23	42	3		22	28.729	28.746	28.759	28.745	.141	.160	.120	100	64	61
6	36	50	4		34	28.645	28.470	28.539	28.531	.170	.247	.260	80	71	78
7	41	57	4		39	28.826	28.902	28.968	28.899	.212	.230	.223	82	51	64
8	47	54	5		45	28.883	28.693	28.594	28.723	.273	.375	.420	85	93	94
9	60	59	4		31	28.427	28 062	28.199	28.229	.518	.483	.222	100	100	83
10	34	36	3		29	28.472	28.551	28.598	28.540	.155	.165	.175	79	72	89
11	30	34	3		19½	28.606	28 588	28.611	28.902	.143	.165	.181	79	79	100
12	23	34	3		20	28.682	28.748	28.883	28.771	.111	.155	.155	86	79	89
13	27	31	3		24	28.976	29.045	29.087	29.036	.135	.125	.155	88	69	89
14	26	39	2		24	29.141	29.064	28.924	29.043	.160	.149	.148	100	71	89
15	29	40	3		24	28.851	29.007	29.139	29.032	.1g5	.103	.170	88	45	80
16	35	43	2		32	29.200	29 185	29.065	29.133	.142	.125	.186	70	40	81
17	43	45	3		28	28.964	28.940	29.085	29.003	.209	.241	.155	75	84	79
18	34	42	3		21	29.111	29.055	29.112	29.093	.155	.190	.155	79	74	79
19	23	42	3		23	29.073	28.889	28.898	28.953	.117	.169	.162	87	65	80
20	36	48	4		25	28.640	28.498	28.463	28.467	.179	.202	.190	80	62	74
21	27	29	2		11	28.583	28.706	28.637	28.642	.117	.142	.101	76	88	86
22	17	27	2		11	28.592	28.611	28.674	28.626	.087	.093	.096	84	63	85
23	19	32	1		12	28.975	29.033	29.081	29.030	.075	.123	.058	70	100	48
24	26	37	3		14	29.109	29.158	29.231	29 166	.093	.129	.119	63	61	64
25	26½	44	4		26	29.233	29.126	29.015	29.125	.129	.151	.226	88	52	91
26	40	39			29	28.821	28.778	28.855	28.818	.225	.236	.152	91	91	63
27	33	40			33	28.854	28.793	28.719	28.749	.175	.225	.254	89	91	92
28	53	58			54	28.552	28.504	28.511	28.522	388	.483	.466	100	100	100
29	59	65			39	28.450	28.461	28.554	28.488	.469	.451	.413	94	78	77
30	43	49			27	28.848	29.001	29.047	28.965	.209	.199	.152	75	57	63
31	....	..			......	......	......	......	......	......	......	......	......	......	......
Sums.	....	..			......	......	......	......	......	......	......	......	......	......	......
Means	....	..		7	26°.3	......	......	......	28.814	.185	.207	.189	84	72	75
Average,.					......	......	......	......	......	.193			77.		

*Flakes of sno

OF DECEMBER, 1864.

Day of Month.	Ther 7 A. M.	2 P. M.	Min. Thermometer.	Barometer Height Reduced to Freezing Point. 7 A. M.	2 P. M.	9 P. M.	Mean.	Force or Pressure of Vapor, in Inches. 7 A. M.	2 P. M.	9 P. M.	Relative Humidity, or Per centage of Saturation. 7 A. M.	2 P. M.	9 P. M.
1	38	4	34	29.100	29.038	29.027	29.055	.186	.238	.267	81	77	100
2	40	4	38	28.758	28.577	28.523	28.653	.248	.286	.374	100	92	100
3	42	3	24	28.501	28.614	28.711	28.609	.222	.165	.138	83	72	71
4	28	3	20	28.779	28.794	28.792	28.788	.117	.130	.135	76	78	88
5	30	3	26	28.664	28.529	28.569	28.587	.148	.162	.170	89	80	80
6	34	3	23	28.784	28.619	28.673	28.692	.175	.150	.130	89	80	78
7	28	2	00	28.444	29.457	28.675	28.559	.135	.129	.036	88	88	36
8	4	6	-25	28.973	29.296	29.422	29.267	.024	.029	.004	47	51	16
9	-17	12	00	29.518	29.337	29.021	29.292	.003	.045	.028	16	60	81
10	29	2	4	28.953	28.931	28.877	28.820	.142	.117	.063	88	87	81
11	17	7	-3	28.540	28.593	28.680	28.604	.078	.045	.031	83	76	52
12	10	21	00	29.016	29.092	29.085	29.064	.054	.075	.045	78	70	60
13	13	20	7	28.864	28.655	28.550	28.689	.048	.091	.073	62	85	59
14	21	2	-17	28.798	28.921	29.078	28.932	.080	.089	.029	71	72	51
15	11	22	9	29.042	28.713	28.801	28.852	.042	.084	.118	59	71	100
16	26	31	23	28.942	28.843	28.789	28.868	.123	.155	.162	87	89	89
17	34	37	12	28.938	29.111	29.241	29.097	.196	.199	.162	100	90	80
18	24	37	20	29.183	28.988	28.872	29.014	.111	.178	.183	86	81	90
19	32	24	6	28.659	28.782	28.880	28.774	.162	.111	.061	89	86	47
20	18	28	9	28.932	28.795	28.713	28.847	.051	.082	.055	52	53	53
21	22	22	-15	28.395	28.353	28.658	28.469	.084	.101	.055	71	86	64
22	14	17	-11	28.996	29.051	29.086	29.044	.067	.063	.060	81	67	80
23	10	12	00	29.126	28.839	28.619	28.928	.039	.045	.020	57	60	29
24	30	32	11	28.860	28.944	28.899	28.901	.130	.143	.100	78	79	74
25	34	37	27	28.689	28.615	28.619	28.641	.155	.178	.178	79	81	81
26	32	37	28	28.680	28.588	28.491	28.586	.143	.199	.191	79	90	90
27	39	40	17	28.182	28.189	28.310	28 227	.216	.225	.175	91	91	89
28	25	27	10	28.523	28.512	28.618	28.551	.100	.129	.055	74	88	53
29	18	23	10	28.514	28.543	28.424	28.494	.051	.111	.059	52	86	65
30	23	24	5	28.383	28.483	28.665	28.510	.100	.123	.008	74	87	2
31	8	22	8	28.862	28.932	29.040	28.978	.062	.082	.048	100	61	42
Sums.	....	..	......	......	......	......	......	......	......	......	......	......	......
Means	....	..	9°.93	......	......	......	28.777	.112	.128	.103	76	78	65
Average, ...			.....	......	......	......	......	.111			78		

WINDS.

This is for the record of the direction FROM which the wind is blowing as indicated by a vane, and its force by estimation. The direction is entered in eight points of the compass: N., N. E., E., S. E., S., S. W., W., N. W. The force is estimated and registered by the following table, in figures from 1 to 10:

1.	Very light breeze	2	miles per hour.
2.	Gentle breeze	8	" "
3.	Fresh breeze	12	" "
4.	Strong wind	25	" "
5.	High wind	35	" "
6.	Gale	45	" "
7.	Strong gale	60	" "
8.	Violent gale	75	" "
9.	Hurricane	90	" "
10.	Most violent hurricane	100	" "

ABSTRACT OF

METEOROLOGICAL OBSERVATIONS FOR 1864.

Mean of Thermometer in open air	48°.99
Mean of Register Thermometer, Max	56°.34
" " " Min	33°.10
Highest temperature August 11th	101°.00
Lowest " Dec. 8th	-25°.00
Range	126°.00
Mean of Barometer	28.840 inches.
Rain and melted snow	28.806 "

CONTENTS.

CIRCULAR TO THE FARMERS OF MICHIGAN:

PAGE.
Cultivated Crops, ... 7
Live Stock, ... 8
Implements, ... 8
Manures, ... 9
Miscellaneous, ... 9

ANSWERS TO CIRCULAR:

From Berrien county, ... 10
" Calhoun county, ... 12
" Cass (1) county, ... 15
" Cass (2) county, ... 16
" Genesee (1) county, ... 20
" Genesee (2) county, ... 22
" Genesee (3) county, ... 27
" Hillsdale county, ... 28
" Kalamazoo (1) county, ... 30
" Kalamazoo (2) county, ... 42
" Lapeer county, ... 44
" Macomb county, ... 48
" Monroe (1) county 51
" Monroe (2) county, ... 56
" Ottawa county, ... 60
" St. Joseph county, ... 66

REMARKS ON ANSWERS TO CIRCULAR:

Wheat, ... 70
Fruits, ... 74
Root Crops, ... 75
Sheep Husbandry, ... 77
Breeds of Cattle, ... 79
Breeds of Horses, ... 81

PAGE
Swine, ... 84
Manures, ... 84
Wood-land, ... 86
Drainage, ... 89
High Cultivation, Irrigation, &c., ... 89
Advancement of the Agricultural Interest, ... 92
Agricultural Resources of the State, ... 92

STATE AGRICULTURAL COLLEGE:
Congressional Land Grant, Swamp Land, Management of College Farm and Garden, ... 95
Experimental Department, ... 97
Practical Instruction of Students, ... 99
Live Stock on College Farm, ... 100
Crops on College Farm in 1864, ... 101
Donations to College Library, ... 104
Donations of Animals, Implements, &c., to College, .. 105
REPORT OF THE FACULTY OF THE STATE AGRICULTURAL COLLEGE, 107
Labor required of the Faculty, ... 107
Influence of the Labor System on Students, ... 110
Military Tactics, ... 112
Extension of Scope of Instruction, ... 113
Number of Students, ... 115
EXPERIMENTS IN TOP-DRESSING GRASS-LANDS, ... 117
TREASURER'S REPORT, ... 122
WARRANT STATEMENT, ... 125

APPENDIX.

CONGRESSIONAL LAND GRANT:
Report of Agent, ... 131
CHARACTERISTICS OF AYRSHIRE CATTLE, ... 135
DRILL AND BROADCAST SOWING OF WHEAT, ... 145
IMPROVED SHEEP-RACK, ... 161
HORSE PITCHFORK, ... 165
SWINE—CHARACTERISTICS OF BREEDS, &c., ... 167

PAGE
The Chinese Breed, 172
" Improved Suffolk, 173
" Large Yorkshire, 174
" Lincolnshire, 175
" Leicestershire, 175
" Byfield, or Newbury-White, 175
" Mackay, 176
" Redford, or Woburn, 177
" Chester-County, or Chester-White, 178
" Neapolitan, 179
" Improved Essex, 180
" Berkshire, 181
" Hampshire, 184
AMERICAN MERINO SHEEP, 187
Cut of the ram Gold-Drop, 188
" of Mr. Sanford's ewe, 191

DISEASES OF CATTLE:

Pleuro-pneumonia Epizootica, 194
Milk Fever, 203
Red Water in Cows, 204
Black Water in Cows, 205
Black Quarter—Black Leg, &c., 206
Cow-Pox, 208
Choking, 211
Tympanitis, Hove or Blown, 213
Impaction of the Rumen, 214
Diseases of the Reticulum, 215
Vertigo—Stomach Staggers, 215
Cachexia Ossifraga—the Stiffness, &c., 216
Diarrhœa, 217
Diarrhœa in Calves, 218
Parasitic Diseases of the Liver, 219
Tubercular Consumption, 221
Abortion, 222
Mammitis, or Garget, 225

PAGE.

RETURNS FROM AGRICULTURAL SOCIETIES:

Barry county, ... 227
Calhoun county, ... 228
Mr. Lacey's Essay on the Cultivation of Wheat, ... 229
Genesee county, ... 335
Hillsdale county, ... 238
Kalamazoo county, ... 239
Kent county, ... 240
Macomb county, ... 241
Account of Sheep-Shearing Festival, ... 242
Ottawa county, ... 244

REGISTER OF METEOROLOGICAL OBSERVATIONS:

Monthly Tables, ...
Winds, ... 249
Abstract of Meterological Observations for 1864, ... 249